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An economic study of "low-income" in Iowa agriculture

Donald Rhodes Kaldor
Iowa State College

NOTE TO USERS

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AN ECONOMIC STUDY OF "LOW-INCOME" IN IOWA AGRICULTURE

by

Donald Rhodes Kaldor

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Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

Head of Major Department

Signature was redacted for privacy.

Dean of Graduate College

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INTRODUCTION

Recent years have seen the development of a genuine interest in the problems confronting low-income agriculture. Lawmakers, social scientists and the general public have become increasingly aware of the conditions of poverty among a large portion of our rural people. The process of conscious recognition has developed slowly, but this is to be expected when one considers the premium Americans have placed upon "rugged individualism".

The impact of general depression upon a complicated and inter-related economy, the intensified problems long-standing in commercial agriculture and the writings of professional and non-professional students have all contributed to the growing realization that the rural income problem cannot be adequately formulated in the phrase "the share of national income going to agriculture". Moreover, though the prevailing concepts of "parity" income and price seem abound with political expediency, they do not define immediate ends, the attainments of which will mean "adequate" income for people in low-income categories. Reaching "parity" income will lessen the extent and severity of the income problem as a whole, yet there will remain a large group whose income will be insufficient to provide the requirements of a socially desirable minimum standard of living. "Parity" prices attained through the price system or by payments attached to resources rather than

people, while they may contribute to higher incomes generally, provide no assurance of "adequate" money income for those families who have little to market.

Partial recognition of these gaps in public policy is evident. Not long after the establishment of the Agricultural Adjustment Administration, supplementary steps were taken to aid farmers who were receiving little help from the AAA. Programs of direct relief, resettlement and rehabilitation were inaugurated. With the gradual improvement in economic conditions following the depth of the depression, more attention was paid to permanent rehabilitation and less emphasis was given to direct relief.

During the 1930's the low-income problem was severest in those areas suffering from drouth and an adverse ratio of population to physical resources. Farmers in these regions were not only affected by low farm prices common to the whole of agriculture, but also by scant physical production per capita. Yet, it was possible to find some farm families in all sections of the country whose available income placed severe limitations on their ability to secure living necessities.

For those farmers whose basic problems were allied with drouth and low prices, recent experience has replaced fear with hope. Nevertheless, while widespread drouth has left, at least temporarily, and farm prices are hovering around parity, many of the basic problems remain. The

sudden change from peace to war has hidden many of these issues behind a curtain of "full employment", but they are likely to reappear to plague us in the future.

The attainment of maximum war power consistent with a skeleton civilian economy requires a proper allocation of resources among the armed services, industry and agriculture. All resources, physical and human alike, must be utilized to the fullest extent. In this effort low-income people have a vital part to play, a part which may not only contribute substantially to the war effort, but if properly directed may lessen the intensity of the post-war problems in this area.

Looking into the more distant future, interest in the problems of low-income in agriculture and industry is not likely to diminish, on the contrary, an expansion seems probable. The declaration of the "Four Freedoms" in the Atlantic Charter points explicitly to a consideration of the low-income problem as a world policy. It remains for the future to tell whether the world can rise to the station implicit in this type of liberal cooperative philosophy.

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In general this study is directed toward the following objectives: (1) to clarify the concept of "low-income" for purposes of empirical research, (2) to obtain a first approximation of the extent of low income in Iowa Agriculture during the period under review, (3) to determine consumption differences for selected items among farm families at different income levels, (4) to investigate the effect of income and consumption on the rate of capital accumulation, and (5) to determine resource differences among farm operators receiving different incomes.

REVIEW OF LITERATURE

Investigations concerned primarily with the low-income problem in American agriculture are of relatively recent origin. The literature growing out of these investigations is not extensive when judged in comparison to the voluminous quantity of writing in closely related fields.

The problem of low-income in agriculture is but one aspect of the general problem of income distribution and has its counterpart in industry in terms of impoverished labor. While having a certain relevance to the problems at hand, a review of literature in the fields of personal income distribution in industry and agriculture is not deemed appropriate. Farm management researchers, consumption economists and rural sociologists have made contributions which have a bearing on the low-income problems. Yet, it is not feasible to summarize these many publications. Popular writers have done much to awaken the public to the conditions of poverty-stricken agriculture, but their work is of a somewhat different nature and does not readily fall within the area of this study.

For the purposes of this review, particular studies have been selected which seem indicative of the type of investigation most nearly approaching the present study and which provide a point of departure.

The first real recognition of the low-income problem came as a consequence of the Great Depression. It is true that prior to this time

much was written about the problems of agriculture. In the main these writings were born of depressed economic conditions also. But there seems to be one significant difference exhibited by the literature of the 1930's. Whereas the preponderance of literature in the earlier years was concerned with the problems of agriculture as a whole, that of more recent date gave special consideration to differences within the rural economy. Surplus, price, credit and marketing problems received nearly the whole of the attention given to agriculture's difficulties in the early period[1], and while some remained a matter of grave concern in the 1930's, problems of inadequate resources, tenancy, soil conservation and migration were coming into their own. The first group of problems more or less affected the whole farm structure, while the latter were more peculiar to certain groups within agriculture. This refinement in approach may well be considered progressive in that it contained a recognition of important aspects previously neglected.

It was during the depression years of the last decade that research with low-income agriculture acquired an importance hitherto not recognized. While the problems had existed since an early date, research activity responded slowly and then only after public action programs demanded information for planning and administrative purposes. As a result, the early interest emanated in the main from federal agencies created to aid the low-income family. It was not until the end of the decade that

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[1]See, for example, J.D. Black in (4).

state experiment stations took an active interest, and even then the proportion of funds devoted to this work was small.[1] In areas where the problems have been most pressing, research funds have been least adequate. Much has been spent in farm management investigations, but few of these have been concerned with the production problems on low income farms. The researcher has been criticized on this score and probably rightly so. But this criticism has also extended to the welfare aspects. This is somewhat less justified. The farm management worker has been concerned with the resource problem on the farm, not with the consumption problem. The difficulties arise in the main out of an improper recognition of the types of problems involved and the lack of proper analysis and synthesis.

With this general background, attention is turned to specific studies. Publications by individuals in the employment of Federal agencies have been of two main types: (1) those dealing with the overall regional or national problems, and (2) those concerned with the problems and effects of the action programs in achieving their objectives.

Of the first type, the series of monographs originating in the Division of Social Research of the Works Progress Administration is typical. (1) These pertain to the problems of low-income agriculture as reflected in resources, farming hazards, part-time farming, landlord-tenant relationships and migration. They included sectional studies

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[1] By 1941 several cooperative agreements between the U.S.D.A. and land-grant colleges had been established.

of relief and rehabilitation in the drouth areas, part-time farming in the Southwest and share cropping in the South. As a whole they provide a voluminous quantity of descriptive material bearing on the national and regional problem.

Beck and Forster (3) prepared a report on resources and rehabilitation in the more important poverty-stricken areas of the country. For this purpose, six areas were delineated where the low-income problem was considered acute. Analytically, they go further than the WPA monographs in explaining the influences at work.

In a somewhat similar vein Taylor, Wheeler and Kirkpatrick (35) studied the "sore" spots in American rural life and depicted the overall factors making for submarginal levels of living among "approximately one-third of the farm population of the Nation". The study is largely "impressionistic" and lacks the factual foundation for adequate refinement.

Going beyond the farm level of living studies common during the 1920's and into an area which is believed to be essential for constructive research, have been the recent studies dealing with levels and standards of living of rural people in designated type-of-farming areas. (25) These investigations were made by the Bureau of Agricultural Economics as part of larger studies concerned with farm resources and farming systems necessary to provide living needs for farm families. They were the outgrowth of a recognition on the part of the Farm Security Administration of a need for standards in planning their program policy.

Typical of the second type have been the studies made by the Farm Security Administration. In the main, the basic data have come from FSA clients. In respect to the rehabilitation program, loan criteria have caused certain types of selectivity, making the clientele unrepresentative of low-income farmers in general. (6, 33) Several studies of rehabilitation progress have been made. (34, 38) In general, the reports indicate a favorable response to the loan and supervisional aspects of the program. Some of these investigations may be criticized for failing to take adequate account of changes in external conditions.[1] Consequently, a part of the increase imputed to the rehabilitation program may well be due to more favorable price, cost or weather conditions or to trend factors associated with the measurement of rehabilitation.

A somewhat different type of FSA investigation is that reported by Bailey. (2) The purpose of this report was to study the problems confronted in planning the organization and operation of farms operated by FSA clients.[2]

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[1] For example, the 1940 report of FSA clients in Union County, Iowa (17) states "From 1938 to 1940 they (3-year FSA clients) were able to increase their holdings of feed and livestock and machinery from $1175 to $1989, an increase of 69 per cent." While mention is made of the price changes in the interim which would account in part at least for the increase, no consideration is given to the corn crops of 1939 and 1940, which for the county as a whole averaged about 65 per cent more than the 1938 crop, largely a reflection of better weather conditions.

[2] The Farm Security Administration and the Bureau of Agricultural Economics have made cooperative studies of specific area and program problems, largely for the purpose of supplying administrative information concerning the problems and conditions with which the FSA programs are concerned. See for example, (26).

In the past several years occasional journal articles have appeared on the problems of low-income agriculture. One by M.L. Wilson (42) has presented the prevailing views on the problem of rural poverty and suggested the importance of studying the human factor. Subsistence homesteads have come to the attention of professional students (44). The general thesis presented in all except the more dogmatic of these writings, gives the subsistence homestead a place in the suggested lines of action but one of relative unimportance.

Some of the earlier writings on low-income farming grew out of investigations in sub-marginal land utilization. (39) Public action has been suggested as the key to the solution.

Part-time farming studies, while not always applying to low-income people, have come in for their share of attention. (15) They have a definite place in the overall income problem. While the geographical concentration of part-time farmers varies considerably, they are frequently overlooked as subjects for investigation in highly commercialized farming areas without good reason.

The early program of resettlement under the FERA has been presented by Westbrook (40), while the recent efforts of the FSA have been considered by Maddox. (22) Too frequently the approach has been one of sympathy, rather than constructive criticism. Maddox presents a provocative case for policy formulation by social scientists in which the "fear" of value judgments is overshadowed by the sheer necessity of "intelligent" planning.

Farm management workers have recently entered the field and proposed the way for further study by this group. Some have suggested the need for a revision of the methods of analysis. (19) Others have concluded that the problem of low-income agriculture is largely a pathological case to which the farm management worker has little to contribute. (8) There seems evident considerable disagreement as to what the farm management researcher can offer. Much of this seems to be the result of a perverted analytical approach. It requires a distinction between the production and consumption concepts of low-income for purposes of analysis and later a synthesis for purposes of action. In this the farm management man has a contribution, but for real value it will require the development of more adequate measurements. A process approach in which analysis over time receives its due consideration is desirable.

Since the outbreak of war and the institution of programs of production expansion in agriculture, the literature concerned with "low-income" farmers has taken on a somewhat different approach. The past interest in the welfare of these farm people has all but been replaced by an interest in fuller utilization of resources. The growing scarcity of labor has brought the suggestion of hidden unemployment on low income farms as a result of lack of crop and livestock work or general inefficiency. (9) Obstacles to increased production have been studied by Schickele (28) with the general conclusion that substantial increases in output are possible if low-income farmers are provided with proper capital facilities and management aids.

In 1941 Stillman, (33) made a comparative study of "low-income" farmers and FSA clients in Iowa.[1] He concluded that, in the main, FSA clients were farmers whose incomes fell among the lowest one-third of a random sample distribution of Iowa farm operators' net incomes. FSA clients included proportionally more young operators than the low-income group. Farmers obtaining FSA loans were operating somewhat larger farms and operated them on the whole more efficiently. Stillman indicated that "the FSA had been successful intensively at rehabilitating individual operators, but extensively it had spread too much in the direction of younger and less experienced operators."

Of special interest to the present study is an investigation carried on by Witt (43). Since the present work employed a portion of the same sample and since several references will be made to this study, a brief summary of the investigation is desirable. The study differed from other low-income projects in that the empirical evidence was obtained from a random sample of 740 Iowa farmers surveyed in 1939. Income groups were established which became the basis for the majority of comparisons.[2] Additional comparisons were made among groups of farmers within the low-income class. These were typed on the basis of sociological and personal characteristics.

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[1] The low-income farmer group was that established by Witt. (43)

[2] Farmers having operators' net incomes in 1939 less than $750 and gross incomes under $3000 were defined as "low-income" operators. The income limit was chosen largely for a matter of convenience and not because it indicated income insufficient for an "adequate" living.

Some of the more important conclusions arrived at by Witt are discussed briefly. A larger proportion of low-income farmers were found in the Southern Pasture Area, though some were located in all type-of-farming areas. There were slightly more owners than tenants in the low-income group. They were generally older and had smaller households than other farmers. Farms operated by low-income farmers were smaller; they had a larger proportion of land in rotated pasture; crop yields were lower and land values somewhat less. The labor supply on these farms was large relative to other resources. A smaller number of low-income operators followed approved practices, while county agents had virtually no contact with them.

THE CONCEPT "LOW-INCOME"

In the literature the term "low-income" has been employed in revealing two general sets of circumstances, not necessarily compatible. To most students the concept plainly has a welfare connotation, implying a quantity of income insufficient to afford a level of living deemed desirable by society or the individual.[1] For others the term has taken on additional meaning which makes it almost wholly an economic concept concerned with the use of productive resources.[2]

It is here argued that for purposes of analysis both concepts are essential, but because of their nature require distinction. The essence of analysis is found in the process of resolving a problem into its component parts in order to gain an understanding of essential causes or principles.

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[1] See for example (31). Ray C. Smith's definition of a low-income farmer runs as follows: "One whose income is too low to enable him and his family to enjoy a decent American standard of living and to have a reasonable degree of security for the future."

[2] See (9) or (28). Rainer Schickele (28) for the purpose in mind in this article states: "Farmers, where there is a relative over-supply of labor and where additional inputs of capital in various forms and corollary improvements in production techniques are needed in order to utilize the existing labor force at near capacity, shall be designated for want of a better term, as 'small scale' or 'low income' farms."

It is generally assumed in research with low-income agriculture that the immediate end is an increase in knowledge for purposes of constructive action. This action is usually concerned with raising the level of living. Recent experience has shifted the emphasis to production expansion. While the two are not necessarily inconsistent, they do require a different type of analytical approach.

How does the income concept fit into the process of analysis? Money-value income as a measurement has two general uses in an empirical analysis of the low-income problem. In part the distinction in use follows the difference between production and consumption economics. Consequently, one has been termed the consumption concept of income and the other the production concept. When applied to the farm and family in agriculture, they are not independent. On the contrary, income in its production and consumption connotations is in a sense as one, an immediate end and a means for the accomplishment of more ultimate ends. The interrelationships are important but seem to have been largely neglected as subjects for investigation in farm management. The impact of consumption on the rate of capital accumulation and the relation of income to both have particular significance among low-income families.

Before the presentation of empirical evidence, it is desirable to establish the framework of the income concepts. The general argument for the distinction is fundamentally the same as applied to the "income and resource problems" and need not be discussed here.[1] Given the

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[1]For a pertinent discussion of these, especially as applied to policy formulation, see T.W. Schultz's article in the American Economic Review (29).

magnitude of a desirable minimum standard income and the content of the "optimum" firm, it is conceivable that a classification of a random sample of farmers on the basis of (1) the consumption concept and (2) the production concept might give identical results. All farmers classified as low-income operators (families) in terms of consumption might also be low-income operators in terms of resource use. But it is also conceivable that farmers who are making the "best" use of resources[1] do not have incomes sufficient to provide an "adequate" level of living. Or, farmers whose levels of living are above the desirable minimum are not making the "best" use of resources. These possibilities make the conceptual distinction more significant.

The Consumption Concept of "Low-Income"

The consumption concept of low income is that generally implied in the literature and discussions of low-income agriculture. This naturally follows from the role of income[2] as a means for the accomplishment of more ultimate ends implicit in material welfare and about which all who are interested in the problem of poverty are concerned. In this sense "low-income" refers to a level of income available for spending insufficient to provide the material for what in the mind of the individual

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[1] "Best" in terms of maximizing market-value income.

[2] Income in this sense refers to the money-value of the net flow of goods accruing to the individual or family over a period of time prior to exchange.

or group is considered a desirable level of living. Thus there could exist all degrees of low-income, depending upon the standard of measurement inferred in the "desirable level of living" and the amount of the spendable income.

In its consumption connotation money-value income is a measurement of the means available for securing purchasable goods and services conducive to material welfare. The consumption concept implies a standard of measurement. This might be considered a socially desirable minimum standard of living which might be provided for from an income of a certain amount. At present there is no "objective" measurement of a socially desirable minimum standard of living or general agreement on what it should contain, although somewhat vague criteria have been suggested for its overall content (27) (22).

The difficulties encountered in establishing standards are no doubt responsible for the lack of suitable measurements in this area. These difficulties are not uniform for the various constituents of the overall standard. The food and nutritional standards are more capable of concrete formulation than, say, medical requirements and these in turn more than education and entertainment. "Objective" scientists have tended to shy away from the problem, partly because of a lack of any common ground or understanding from which departure might be made. In addition, the firm belief in free consumer's choice has affected thinking about such things much like laissez faire economics influenced the approach to the problems of production.

It is true that differences in valuations, resulting largely from contrasting environments and therefore experiences, lessen the similarity of consumption patterns and destroys some of the validity of common standards in an economy of "free" consumer's choice. Much of the freedom consumers have is usually in a relatively narrow zone of experience, making the concept in the broad sense largely mythical, but significant differences do exist and raise important questions in the realm of policy. Nevertheless, standards might be developed which take into account certain differences, not all to be sure, but a sufficient number to provide a reasonable basis for measurement. The whole problem involves the concept of utility which in more abstract form has offered difficulty to economists. The development of standards will no doubt require an amount of "subjective" judgment unless social criteria can be adequately formulated, which to some may cause apprehension. But then in dealing with problems of welfare there is little "objectivity" of the kind common to the deductions of economic theory (5). Rather than thinking wholly in terms of ideal arrangements, it becomes necessary to compromise and accept something better than exists though it may not exhibit all the characteristics of the ideal. Without this compromise the problems of civilization become insolvable. It is in this where we find the essence of progress.

Economists and public administrators have indicated a need for standards of this type (21, 29).[1] The farmer's long fight for "parity"

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[1] As one of the "Four Freedoms" set out in the Atlantic Charter, freedom from want implies a measurement of this kind. We have had occasion to use for first approximation purposes a standard developed by the B.A.E. for farm families in Southern Minnesota. This is discussed in a later section.

implies "adequate" income in some form. When we ask "adequate for what"? the only reasonable answer is found in terms of what the individual or group considers adequate for attaining some level of living believed to be "fair" or "just".

We are here not concerned with the content of the standards, others in the professional field have probably more to contribute in this area than those who are interested primarily in the economic implications of a given standard. What is of importance to research in the low-income field is that such standards be developed.

Adequate measurements would provide a basis for measuring the degree of income deficiency. A low-income farm family might then be defined as one having an income insufficient to provide the material implicit in the standard. For more refined analysis consideration would have to be given to the constituent parts. A comparison between the standard income and that received by a family may indicate a sufficiency of income, yet actually there may be a deficiency due to a difference in the direction of expenditure. A minimum standard income may provide for one suit of clothes for the individual each year, but a particular person may value clothes highly and buy three suits, leaving a quantity of income insufficient to fill the remainder of the standard. Money measurements are frequently poor indicators of "real" worth or that associated with usefulness as distinguished from "show". In terms of the family a flow of income sufficient to provide the things implicit in the standard may not do so as a result of mis-allocation among the

family members, some members receiving more than their relative share. In addition, a lack of market knowledge in terms of prices and qualities and ignorance of the content of an "adequate" standard as characterized by, say, nutritional requirements, influence the attainment of the level of living implicit in the standard income. Assuming a substantial degree of consumer's choice to exist, educational programs provide the one means by which the values of the component parts of the standard may be impressed upon the mind of the spender. This problem is concerned with values more fundamental than those of the market place.

In order to bring about a closer correspondence between actual expenditures and those implicit in the standard, some have suggested coercion. Others feel that attachment of consumption requirements to subsidies provides a means. This seems a fruitful method and especially appropriate if these subsidies are clearly associated with consumption and do not become a means for the solution of production problems.[1] There are some people who believe that any interference with consumers' sovereignty is bad. Implicit in this thinking is the belief that the individual knows what is "best" for himself and will act accordingly, maximizing his satisfactions.[2] While this view may have been justified

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[1] This does not preclude production subsidies.

[2] More realistically, the individual at any time may think he knows what is best for himself, but his thoughts are limited by his range of experience; with an increase in experience his thoughts and values change and what is now considered "best" may be something quite different.

in the early period of liberal philosophy when it provided one of the strongest arguments against mercantilism, more recent developments in social organization have indicated clearly that a maximum freedom of some kinds requires a curtailment of others. Rights imply corresponding duties (24). Our rapidly changing institutional structure abounds with examples.

While these arguments are crucial to practical programs of implementation, they do not distract greatly from the rise of standards in research. Here their primary purpose is to provide a point of departure in terms of things implicit in the standard income. It is desirable, of course, to have the standard income in correspondence with socially accepted criteria.

As implied in the consumption concept, the income relevant to material welfare is that which is available to the family for consumption. For the farm family this might include income from farm resources, subsidy or cost payments by the government, miscellaneous income to the operator from off-farm work and non-farm investments and income received by other members of the family partially dependent upon the operator. Family net income would provide a more complete measurement of the means available for consumption than, say, operator's net income, the error being dependent upon the relative importance of various sources of income. In part-time farming areas omission of off-farm income to the operator or other family members would be serious.

Difficulties are encountered in using the common income measurements (19). Presumably an increase in inventories is a non-spendable income and thus not available for consumption. This is generally entered in calculating family and operator income. Labor income as usually determined omits income from capital investment as well as the value of farm-produced products used in the home. A summation of net cash income and the value of home-used products might be employed. This can be objected to on the grounds that in cases where there has been a decrease in the cash position at the expense of inventories, the cash income may be low for a given year, yet consumption might not be hindered because of an accumulation of cash savings. The purchase of feeder cattle in the fall of the year might lower the cash position to such a point that the net cash income for the calendar year is less than the standard, though in the next period inventories would be transformed into income available for consumption.

In practice, "living on capital" is a frequent phenomenon, especially in depression years. Depreciation and land accounts, the latter by over-cropping, might be dissipated in order to maintain consumption. While really not income, it is spendable and therefore an available safety factor. Money from these sources should not be included in a measurement of income for consumption. The same does not apply to interest on investment which is omitted in a calculation of "labor" income, since this is available for either spending or savings without depletion of capital.

The Production Concept of Low-Income

Similar to the relation of the consumption concept to the consumption unit, the family, the production concept is related to the production unit, the firm or farm. In its production connotation, money value income is a measurement of resource capacity and efficiency.[1] The net income, which a farm operator receives from his farm business under any set of price and operating cost conditions, is the end product of the quantity and the quality of resources owned and controlled and the manner in which they are put to use. In other words, variations in net income among farmers are associated in the main with differences in the scale of operations and the combination of productive factors. The production concept considers the farmer as a particular type of resource in his role as laborer and entrepreneur. When employed in analysis at points in time, it is largely static in that it disregards the import of family welfare on the productive combination. In agriculture where the firm and household are so closely related this omission is serious, especially among low-income families.

The production concept of income requires a standard of measurement as did the consumption concept. For this the theory of the firm provides a theoretical model permitting definition of a "low-income" unit. Given a quantity of the entrepreneurial factor, the optimum farm in agriculture might be characterized as one in which all productive

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[1] In this sense money-value income refers to the money value of the net flow of products from farm resources.

resources are employed in a manner equalizing their marginal returns, and investment in each direction has been pushed to the point of equality between marginal revenue and cost. The scale of operations would then be commensurate with the managerial capabilities of the operator and productive factors would be apportioned in the most economical fashion. To this optimum firm would accrue the maximum net income. A "low-income" unit might then be defined as a productive combination producing a flow of products, the net money value of which is less than that from the "optimum" firm.

This of course is highly theoretical. What constitutes an optimum firm under conditions of uncertainty presents in itself a nice problem. Marginal analysis has provided solutions under static conditions and conditions of dating with given expectations, but the problem facing the farmer is far more complex (11). For a given set of conditions an optimum unit exists, but reality is constantly changing and what is more important, these changes are uncertain (30). The optimum unit today is not the same as that tomorrow. Over a period of time it can probably be described as one for which net income is less than a maximum for one set of conditions in order that it may be more than a minimum for others (10). Two factors stand out as important, (1) uncertainty and (2) specialized durable resources.[1]

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[1] In applied analysis some of the more important problems are related to entrepreneurship, the effects of environment upon its functioning and the characteristics which go to make up an agricultural entrepreneur of capacity and efficiency. Little is known about the process of decision making as it occurs on the farm, the impact of uncertainty or the effects of past experience. In addition, the effective quantity of entrepreneurship is not a static notion as theoretical models conveniently assume. It is dynamic and progressive. The farm operator's ability to make proper adjustments is in part dependent upon his experience, actual and acquired.

While the exact content of the optimum firm as a going concern is not known, it provides in its theoretical role a frame of reference essential in analyzing actual operating units. As a hypothetical standard the optimum firm suggests that the degree of low-income be measured as a differential, the difference between the net incomes accruing to the optimum unit and the low-income farm. Without a clearcut description of the optimum unit, we cannot employ its content as a standard of measurement. Although this limitation is severe, yet the model does give the problem a perspective which is helpful in analysis.[1]

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Under a system of private property, the returns to the resources employed in production revert to their owners. Consequently, the income received by the farm operator will be dependent upon (1) the net income accruing to the farm as a whole, and (2) his contribution to the productive process in terms of resources. Although the resources of the firm are employed in the optimum fashion, if the operator owns (equity) only a portion of the factors, his income will be something less than that of the farm. Analysis of the farm from a strict viewpoint of resource utilization must be supplemented by a study of the ownership and control of resources by the operator, if a full explanation of his income level is to be obtained.

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[1]The budget method in farm management research is an attempt to employ the "optimum" firm idea. Its limitations are largely related to the establishment of expected prices, costs and production rates.

A Note on the Use of Economic Analysis

The tools of economic analysis have application in both areas of the dichotomy outlined above. The allocative aspect of economy is characteristic of both the source of income in its relation to physical and human resources and the expenditure of income in relation to consumption. Our chief interest lies on the production side, though this does not imply that the consumption side is unimportant. As applied to the low-income problem they are similar to sides of the same shield. Both parts of the dichotomy have certain elements in common which are deeply rooted in people's basic values and beliefs.

The analytical principles for the solution of the resource problem are involved in marginal analysis. Its application is generally restricted to problems involving a system of market valuations in terms of prices. In general the tacit assumption is that resources are being employed solely for the attainment of intermediate ends, the relative valuations of which find objective realization in terms of relative prices. This abstraction is well enough for certain problems. But in policy discussions, it is frequently implied or explicitly stated that that allocation of resources is "best" which leads to a more complete maximization of the intermediate ends reflected in relative prices. The consequence is that these discussions are not concerned with the relationships between means and ends but rather with the evaluation of ends. The implication is that those ends which are reflected in relative prices are more desirable of attainment than others which are alternative employments for the resources involved. While there is nothing wrong with discussing ends as such, there should be a clear distinction between the relation of means to ends and the ends themselves.

These difficulties arise because of a lack of an objective scale of valuations common to both market and non-market values. In the real world market values are only a part of the totality of values with which man is concerned. In the employment of resources he frequently makes a compromise between the attainment of maximum market-value income and non-market-value income, a phenomenon which has a direct bearing on the pattern of resource use.[1]

The problem of the "family-size" farm when it involves the sacrifice of market-value income is an example. It might be argued that within the general definition of economy, resources allocated in a manner maximizing the ends implicit in the family size farm are as much an economical allocation as that maximizing market-value income.[2] With a common scale of valuations for ends implied in both, presumably there would exist only one allocation which would maximize these ends.

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[1]Market-value income refers to the flow of satisfactions derived from goods or services upon which the market sets a price. Non-market value income relates to the flow of satisfactions derived from things which have no market price. The former includes the goods and services purchasable for a money price, the latter, things having a resource cost but no product price. Leisure and satisfactions derived from farm ownership, apart from the marketable products, might be examples. Indirectly these affect market-values but provide no basis for common evaluation. In this sense for purposes of policy they might become an argument for status quo.

[2]Restricting the definition of economy to exchange or things brought under the measuring rod of money does not solve the problem, it omits it.

Farm-ownership, when it means a sacrifice of market value income, is another example. Similar problems arise in the allocation of resources within the firm. Farmers whose resources have personal non-market valuations for particular uses which exceed those of the market will not have the same resource allocation as operators whose market-valuations take precedent. The intensity of the operator's labor will be dependent upon this phenomenon. The operator who values leisure highly will find less reason to push his labor use in terms of market-value income. Since the focal point in terms of decision is the operator, his set of valuations will influence the manner in which resources are used.[1]

In the area of low-income there is reason to believe that contrasting market and non-market valuations are important. Criteria which effectively characterize the difference are difficult to find and measure.

Because of a lack of adequate measurements, progress in the field of low-income research will be slow and seemingly sterile. With the discovery that low-income farmers possess limited physical resources, we have found a cause of their present predicament. When we ask the question, why are their resources limited, we discover reasons less superficial and more fundamental. By a process of delving deeper and deeper into the outward causes, we approach the more basic factors. It is in this process that difficulties are encountered for want of adequate measurements of interrelationships and effects. Until more progress has been made in this area, investigations of low-income agriculture are not going to be very adequate and our action programs not too intelligent.

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[1] To the individual market and non-market values have a sort of mental common denominator which provides a basis for rational choice, but there is no pricing process for non-market values similar to that for market-values and upon which marginal analysis may function collectively.

EMPIRICAL BASIS OF THE STUDY

This investigation has its empirical basis confined to Iowa, a state which in 1941 had a cash farm income of 920 million dollars or approximately $1000 for every man, woman and child on farms, the largest of any single state in the nation and approximately 8 per cent of the nation's cash farm income in that year (37).

While it is reasonable to believe that certain characteristics of low-income agriculture in Iowa are similar to those in other states, the extent and severity of the problems are in sharp contrast. Consequently, the low-income problems in Iowa provide a poor representation of the national or regional picture.

The Sample and Population

The basic data for the analysis were obtained from a random sub-sample. In order to clarify the relation between the sub-sample, the original sample and the population, the method of selection is explained in some detail.

During the latter part of 1939 the Iowa Agricultural Experiment Station and the United States Department of Agriculture cooperated in taking a sample census survey. The population was defined as the agricultural area of Iowa, exclusive of incorporated districts. Eight hundred ninety-seven sampling grids were chosen in the following manner.

"Quarter section grids were selected for the sampling unit; the county was set up as the stratum. Townships were selected at random from each county - seven from an average size county of 16 townships and in the same proportion for counties of other sizes. Quarter sections were selected at random from each of the selected townships, one each from five and two each from the remaining two."(18)[1] The method of field enumeration was employed in obtaining the data from farmers whose farmsteads were located in the sampling unit. The completed survey provided sufficient farm management data for the preparation of income estimates on 740 farms.

The sample employed in this study was selected from this group of 740 farms. The sample census farms were sorted by type-of-farming areas and approximately a third of the farms were selected at random from each area (12). This provided a sample of 252 farms consisting of representatives from all the income classes employed in the 1939 study by Witt (43).

The 1941 data were obtained by enumerators during the months of January and February, 1942, through the financial cooperation of the Iowa Agricultural Experiment Station, the Farm Security Administration and the Bureau of Agricultural Economics. A schedule relating to income, expenses, farm practices, debts, tenure and sociological characteristics provided the basis for questioning the farmers.[2] Prior to the interviews farmers

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[1]A detailed report of the sampling procedure and the representativeness of the sample are found in this publication.

[2]The basic factors entering the income and expense portion of the 1941 schedule were practically the same as in 1939.

were contacted by post-card, notifying them of the intended interview and asking their cooperation.

An endeavor was made to obtain records from farmers who had moved in the interim between 1939 and 1941, as well as farmers who in 1941 were operating sample census farms. Consequently, three types of matching existed in the sample: (1) matched farmers on matched farms, those operators who continued to operate the same farm as in 1939; (2) matched farmers on new farms, those who had moved to other farms; and (3) new farmers on matched farms, those farmers who were not operating sample census farms in 1939 but who were doing so in 1941.[1] Since our chief interest is centered in the operator and his family, the analysis is based upon the group of matched farmers, including groups 1 and 2 above.

As a result of factors beyond the control of the enumerators, the actual sample forming the basis of empirical evidence is smaller than that planned. Table 1 indicates the quantitative relation between the planned and completed sample and the causes of the enumeration loss. The total enumeration loss on the basis of matched farmers amounts to 19 per cent of the planned sample.

Sample Representativeness

Of crucial importance to any investigation based upon sample data is the degree to which the statistics derived therefrom represent the

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[1] In an effort to decrease costs of enumeration, letters were sent to each county AAA chairman to inquire if the farmers in the AAA program included in the sample continued to operate the same farms in 1941. The replies were exceedingly helpful in arranging the enumeration schedule.

population parameters. The validity of inductions or generalizations made from sample studies is dependent upon this relationship. In order to provide a clear picture of the sample-population relationship, the discussion will prove to be more detailed than is usually encountered in farm management studies. The importance of sample representation requires this, for adequate knowledge might readily destroy the whole of what otherwise seem warranted conclusions. Of course, as in all investigations in subject matter fields, "adequate" statistical evidence is in itself not enough to warrant probability statements about phenomena which find no logical basis for existence in the frame of reference employed. Even then they are merely probability statements which should, for scientific accuracy, be considered as tentative and subject to further investigation.

The sample under consideration was not selected with due regard given to the information available for determining sample size. Data from the 1939 sample census provided statistics of farm management character which might have been employed in determining the sample size required to give estimates which for a given probability value would not be expected to differ from the population mean by more than stated quantities, depending upon the reliability desired.[1] Before the necessary calculations were

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[1] In research of this type the investigator is usually interested in estimates of several, sometimes many, different factors. Unless highly correlated the relative variances are likely to be quite different. This means that to obtain estimates of equal reliability the sample size would vary directly with the variance, those with larger variances requiring a larger sample than those with smaller variances. With enumeration costs important, the problem can be compromised by weighting the cost of additional records against the increase in reliability. By means of stratification variances may frequently be decreased without appreciable increase in cost. For a discussion of the problem of sampling and cost see Jessen in (18).

Table 1. Quantitative Relation Between Planned and Completed Samples and Reasons for Enumeration Loss, by Type-of-Farming Area

Characteristic	Northeast dairy	Cash grain	Western livestock	Southern pasture	Eastern livestock	Total
Records completed						
Matched farms and farmers[1]	38	34	35	27	45	179
Matched farms	13	8	9	5	5	39
Matched farmers	9	3	5	3	4	24
Total matched farmers[2]	47	37	40	30	49	203
Records incomplete	2	1	2	5		10
Location of operator unknown	1	4	3	1		9
Refusals		4	1	1	2	8
Operator not reached by enumerator		1	2	7	2	12
Operator moved to town	2	1	1	2	2	7
Rural home (not a farm)		2		3		5
Operator died since 1939		1		1		2
Farm part of a larger unit		1			1	2
Total (not duplicated)[3]	52	50	49	46	55	252

[1] Includes a 1939 partnership between father and son which was dissolved in 1940. In 1941 father and son operated distinct farms.

[2] Total of matched farmers on matched farms and matched farmers on new farms. It is this total that provides the basis of the investigation.

[3] Includes all matched farmers or all matched farms.

completed the amount of funds to be spent for enumeration purposes was fixed and the enumerators were ready for work. Further delay at that time was not practical. Later calculations indicated that funds were the limiting factor in increasing the sample size. The sample actually enumerated provided estimates of certain factors sufficiently reliable for their present use, but on others, a larger sample would have been desirable.

In order to increase the sampling efficiency, the sample was stratified by type-of-farming areas. Further geographical stratification did not seem worth while. There is some evidence that income stratification might have been desirable.

In Table 2 are shown the estimates of selected factors from the sample census, the planned sample and the completed sample. Standard error and t-values have been determined. The factors selected for comparison include some chosen for reason of their importance in farm management analysis, e.g. size of farm, and others, because it was thought they might be subject to greater variation, e.g., total value of livestock sold. All figures apply to the farm business during the year 1939.

For the several factors selected for comparison, the differences between the mean values of the sub-samples and the sample census were all within the range of sampling error (5 per cent level of significance). For the completed sub-sample, t-values were largest for total acres operated and value of livestock sold, smallest for number of pigs raised and operator's net income. On the majority of items, the difference between means was less for the completed sample than for the planned sample.

Table 2. Relation Between Sub-sample Estimates and Sample Census Estimates, Standard Errors and t-Values, for Specified Factors, 1939

Factor	Sample Census			Planned sample				Completed sample*			
	Mean	Standard deviation	Coefficient of variation	Mean	Standard error[1]	Difference in means	t-value[2]	Mean	Standard error[1]	Difference in means	t-value
Number of farms	740			252				203			
Total acres operated	175.2	111.8	63.8	187.2	8.61	12.0	1.39	182.1	9.21	6.9	1.33
Acres in corn	47.5	34.2	72.0	49.8	2.64	2.3	0.87	49.8	2.82	2.3	0.82
Yield of corn	51.9	19.1	36.8	51.8	1.47	0.1	0.07	53.4	1.57	1.5	0.96
Number pigs raised	67.8	59.2	87.3	68.1	4.56	0.3	0.06	68.0	4.88	0.2	0.04
Value of livestock sold	1357.6	1787.3	131.6	1550.7	137.64	193.1	1.40	1514.6	147.24	157.0	1.07
Value of crops sold	156.4	375.9	240.3	117.4	28.95	39.0	1.35	127.9	30.96	28.5	0.92
Operator's net income	1119.0	1082.8	96.8	1160.0	83.39	41.0	0.49	1132.6	89.20	13.6	0.15
Per cent owners and part owners	48.6			49.6				51.2			
Per cent tenants and managers	51.4			50.4				48.8			

[1]Obtained from the relationship for finite populations, $S.E. = \frac{s}{\sqrt{n}} \sqrt{1 - \frac{n}{N}}$ where S.E. is the standard error, s the standard deviation of the Sample Census data, n the size of the sample and N the size of the Sample Census.

[2]t-values calculated from the relationship $t = \frac{\bar{X} - \bar{x}}{S.E.}$, where $\bar{X}$ is the mean of the Sample Census, $\bar{x}$ the mean of the sample, and S.E. the standard error of the sample mean obtained as indicated above. t-value for 1 per cent level of significance with 250 degrees of freedom is 2.60; for the 5 per cent level, 1.97.

*Sample used for 1941 analysis and includes matched farmers on matched farms and matched farmers on new farms.

Since the sub-sample estimates were generally larger than those of the sample census, this indicates that the enumeration loss consisted of farmers with factor measurements larger than average for the planned sample. The movement of the completed sample estimates in the direction of the sample census was more desirable than the reverse.

Errors in the Data

In addition to the errors of random sampling there are others which affect data of the type employed in this analysis. They include intentional and unintentional biases, resulting from memory inaccuracies, misunderstanding of questions, deliberate mis-statements and lack of interest. They may be influenced by the farmer, the enumerator and the investigator in the formulation of the schedule.

We have no measurement of either the direction or the extent of these errors as they apply to the 1941 data. Inventory checks were employed when possible to keep certain of the errors at a minimum but they are almost certain to enter and affect the estimates.

Studies by Jessen (18) and Hopkins (14) indicate substantial reporting errors in data obtained by the survey method of field enumeration. Jessen found that even when employing inventory checks, as was done for this study, only 81 per cent of the hogs in the ending inventory were reported in the beginning inventory when a year later the same question was asked a group of 396 matched farmers in 1939. On other items the

error was not as large. Hopkins, in comparing income and expense estimates obtained from field survey schedules with records kept throughout the year, concluded that estimates of both income and expenses tended to run smaller in the survey than on records for the same farms. Since his comparisons were made on farms where records had been kept, the error would probably run higher than 12 and 13 per cent on a random sample including non-record keepers.

While these errors are probably not serious when intra-sample comparisons are employed, they are important in overall estimates.[1]

There is likely to be a bias of a known type entering the sample employed in analysis as a result of the enumeration loss. As was seen in Table 1, the enumeration loss was heaviest in the Southern Pasture Area which also contains proportionally more low-income farmers (43). Consequently, a relatively larger group of farmers with characteristics common to the low-income group have been omitted from the completed sample. Therefore, these characteristics find less expression in our sample estimates.

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[1]This is particularly damaging in the section dealing with a first approximation of "low-income" in Iowa agriculture.

THE CONSUMPTION CONCEPT IN IOWA AGRICULTURE

This part of the study is concerned with certain aspects of the welfare of farm families in Iowa. In applying the consumption concept of low-income, it would be desirable to employ a generally accepted standard income for measuring purposes. Without this, one must be content with (1) a standard income prepared for use in Southern Minnesota by the Bureau of Agricultural Economics (26)[1], and (2) comparative income analysis of selected consumption items by use of a statistical designation of low-income. While the Bureau's standard income is not sufficiently adequate, it will provide a basis for obtaining a first approximation of the degree of low-income in Iowa during the years under review.

A First Approximation

The Bureau's standard income for Southern Minnesota required an income of cash and family living from the farm valued in terms of 1936-40 prices of $812 per family of 4.4 members. Of this amount about two-thirds (69 per cent) was cash income, leaving roughly a third to be furnished by

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[1]See Appendix B for a description of the standard income.

farm produced products, exclusive of house rent.[1] Translated into income per adult equivalent, this amounts to about $232.[2] Since prices in 1941 were somewhat higher, an adjustment was made which raised the standard income to $865 or about $250 per adult equivalent.[3] A family of the average size included in the sample, 3.1 adult equivalents, would require an income of cash and family living from the farm of $750 in order to attain the level of living implicit in the B.A.E. standard.

How did Iowa farm families fare in terms of this standard income in 1941? As was suggested in an earlier section this depends upon the type of income measurement employed. To begin with, use was made of a summation of the estimates of net cash income and the value of home used products. In 1941 about a fifth (21 per cent) of the farm families in the sample had net cash incomes plus the value of home-used products less than $250 per adult equivalent. The average value for all families in the sample was $779 while that for the lowest one-third of the array of net operator's income per adult equivalent was $274. (Table 3)

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[1] In addition, the standard income included the services of a dwelling valued at $1000 to $1500.

[2] Throughout this study the size of the family has been measured in terms of adult consumption equivalents. The equivalents were developed by Carl C. Zimmerman from computations made by L. Emmet Holt. See Appendix B for the scale of equivalents and a brief description of the measurement.

[3] On the basis of the change in prices reported paid by farmers for commodities used in living as published in "The Agricultural Situation" (36), the standard income was adjusted upward by 6 per cent.

Table 3. Comparison of Income Estimates Between All Sample Farmers and Farmers in the Lowest One-Third of the Income Array, and the B.A.E. Standard Income, 1941

	B.A.E. standard	All farmers	Lowest one-third*
Cash and living from farm per adult equivalent	$ 250	$ 779	$ 274
Living from farm per adult equivalent	77	97	76
Net cash income per adult equivalent	173	682	198
Value of dwelling	$1000-1500	$2340	$2062

*Lowest one-third of the array of operator's net income per adult equivalent.

But this over-states the extent of low-income in terms of the Bureau's standard. Some of the farmers with cash incomes less than the standard had negative cash incomes, largely as a result of inventory increases. Many of these no doubt had important cash reserves, some borrowed money to buy with. The result is that net cash income as calculated is probably a poor indication of cash available for expenditure on living.[1] The value of inventory increases would accrue in part at least in the form of cash income in subsequent accounting periods.

The picture becomes quite different if family net income per adult equivalent is employed as the income measurement.[2] In 1941 only about

[1] See Appendix A for the content of net cash income.

[2] Family net income includes among other items the value of inventory changes, home-used farm products, cash income to the operator and income to other members of the family. See Appendix A.

5 per cent of the sample families had net incomes (per adult equivalent) less than $250. But this probably errors on the other side, since income accruing in the form of inventories is not available for expenditure on living. In terms of operator's net income, about the same number of families had incomes less than $250.[1]

It is almost certain that the situation in 1941 was not any worse (in terms of the B.A.E. standard) than depicted by the measurement of cash income plus the value of home-used products, while it is highly probable that it was not as good as indicated by family net income. The wide range, 5 to 21 per cent, suggests the importance of selecting income measurements.[2]

For the situation in 1939 operator's net income has been employed, since estimates of net cash income plus the value of home-used products or family net income are not available. Prices paid by farmers for commodities used in living were somewhat less in 1939 than in 1941. The Bureau's standard income was therefore adjusted to a level of $240 per adult equivalent (36).

On the basis of operator's net income, about 35 per cent of the sample families had incomes less than $240 in 1939. The comparable figure for 1941 was 5 per cent. Farm prices in Iowa had advanced from an index number of 97 (1909-14 = 100) in 1939 to 130 in 1941, an increase of about

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[1] In 1941 the operator's net income constituted 99.7 per cent of family net income. For the content of operator's net income see Appendix A.

[2] Unless the scale of operations has and upward or downward trend, net cash income and operator's net income should not give substantially different results in the measurement of relative incomes. But in 1941 incomes accruing in the form of inventories were larger than in 1939.

34 per cent. The volume of physical production increased also. The result of this combination was an estimated decrease in the first approximation of low income, as measured by operator's net income per adult equivalent, of about 35 per cent.

As will be pointed out in more detail later, there is considerable year-to-year variation in the position of individual farmers in the income array. In order to adjust this in part, and thereby obtain a somewhat better picture of the longer run relative level of income, an average of the operator's net income data for 1939 and 1941 was employed. When these averages were arrayed, it was found that about 13 per cent of the sample farmers had incomes per adult equivalent under $240 to $250.

It has been suggested that substantial errors are likely to affect the estimates of income. On the basis of the evidence presented by Hopkins (13), the estimates of net income are likely to be on the average somewhat higher than the true values.[1] Because of large variations from farmer to farmer, the estimates may not be higher in the lower end of the income array, they may even be smaller.

What can be concluded from these estimates of the degree of "low-income" in terms of the B.A.E. standard? Probably nothing very definite. It seems likely that over the two-year period not more than about 20 per cent

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[1] If gross income is larger than gross expense, an equal percentage error in the estimates would result in a net income higher than actually existed. Hopkins' figures showed a 12 per cent error in the average estimate of income and a 13 per cent error in expense. But larger variations also occurred. Other factors are involved as well.

of the families had incomes available for living less than $250 per adult equivalent. In 1939 the figure may have approached 30 to 35 per cent, while that for 1941 was probably in the neighborhood of 10 to 15 per cent.

Income Group Comparisons of Selected Consumption Items

For comparative income analysis, the family income level was measured by the average net income received by the operator in the two years, 1939 and 1941. Because of important year-to-year variations, a two-year average might be expected to provide a more reliable indication of the longer-run level of income than the estimate of a single year.

There is good logical reason for expecting the level of living to vary not only with income but also with the size and composition of the family. Consequently, the income data were adjusted for differences in family size as measured in adult consumption equivalents.[1] Within limits, the resulting measurement reflects the amount of income relative to the potential consumption power of the family as influenced by size, age and sex.

The array of average (1939 and 1941) operator's net income per adult equivalent was divided into three groups, approximately equal in number. For convenience in discussion, the highest one-third group has been designated Class A; the middle group, Class B and lowest one-third group, Class C. The term "low-income" group will be used interchangably with Class C. It should not be inferred that this indicates a deficiency of income in terms of an acceptable standard. The division was made wholly

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[1] Includes only family members dependent upon the operator for support. See Appendix B for the scale of adult equivalents.

for the purposes of comparative income analysis. Families in Class C had net incomes per adult equivalent for the two-year period only 18 per cent as large as those in the highest income group.

Before turning to the discussion of consumption items, a brief background in terms of farm, operator and family characteristics is desirable.

Farm, operator and family characteristics

In 1941 operators in the low-income group received net farm incomes which averaged only about a third as great as those received by farmers in Class A (Table 4). The smaller incomes of the low-income group were largely a reflection of smaller scale operations. Class C farmers operated significantly smaller acreages and possessed a net worth value of only about 37 per cent as large. Farm debt averaged consistently more for the high income groups, but differences were not statistically significant. The net capital ratio (equity) for the low-income group averaged somewhat less but was not significantly smaller. A significantly larger number of farmers in Class C were tenants, 55 per cent as compared to but 30 per cent in Class A.

A smaller net farm income was only one important reason why these farmers were in the low-income group. If incomes had been distributed in proportion to family size (measured in adult consumption equivalents), the adjustment for family size would not have affected the groupings. Two things point to the importance of family size in affecting the

Table 4. Specified Operator, Farm and Family Characteristics, by Income Classes, 1941[1]

	Income class			Significance
	A	B	C	
Average (1939 and 1941) operator's net income per adult equivalent	$1520	$ 594	$ 274	
Age of operator (years)	49.4	47.5	47.3	*
Operator's personal net worth, 1941	$16,994	$ 9,879	$ 6,408	**
Net farm income, 1941	$ 4,243	$ 2,391	$ 1,410	**
Total farm and non-farm debt, 1941	$ 4,269	$ 2,784	$ 2,210	***
Per cent equity, 1941	34	84	78	***
Acres operated, 1941	217	188	159	**
AAA payments, 1941	$ 317	$ 208	$ 153	**
Number of owners and part-owners	47	35	31	*
Number of renters	20	33	37	
Size of family raised	3.15	4.07	4.59	**
Size of family at home in adult equivalent	2.14	3.18	3.88	**

[1]Income classes refer to the division of the array of average (1939 and 1941) operator's net income per adult equivalent.

*Group differences significant at the 5 per cent level.
**Group difference significant at the 1 per cent level.
***Group differences not significant.

composition of the income groups. In the first place, the differences in operator's net income were substantially less than the differences in operator's net income per adult equivalent. Secondly, farmers with the highest incomes per adult equivalent were supporting families only 55 per cent as large as the low-income operators. The larger families which on the basis of "need" might require additional income, were not those who received the highest incomes.

Families in Class C were not only supporting significantly larger families in 1941 but they raised larger families also. Over a period of years, a small income per adult equivalent would be reflected in the farmer's ability to accumulate capital and thereby affect the scale of his farming operations.[1]

The average age of operators in the low-income group was somewhat smaller, but the differences were not significant. A study of the age distribution points to two important facts. A larger proportion of the farmers in Class A were in the younger and older age groups (Table 5).

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[1]This is discussed in more detail in the section entitled "Income, Capital Accumulation and Net Worth". Witt (43) concluded that low-income farmers had smaller "households" than those in the higher income groups. The conflicting conclusion can be reconciled on two scores. First, the number of people in the household is not exactly comparable with the measurement of family size in terms of adult consumption equivalents. Secondly, his designation of low-income was more in keeping with the production concept and took no account of family size. Consequently, differences in family size had no effect on the composition of his income groups. Stillman (33), in referring to the Iowa data states, "There is no indication that low-income farmers have the biblical number of children often attributed to them. On the contrary, low-income farm families seem not to differ in size from other families." These considerations point to the desirability of distinguishing the two concepts of low-income.

Table 5. Age of Operator, by Income Classes, 1941

Age interval years	Income class					
	A		B		C	
	Number	Per cent	Number	Per cent	Number	Per cent
20-29.9	7	10.6	5	7.3	6	8.8
30-39.9	10	15.1	14	20.6	13	19.2
40-49.9	15	22.7	19	28.0	16	23.5
50-59.9	14	21.2	21	30.9	23	33.9
60-69.9	17	25.9	7	10.3	8	11.7
70 & over	3	4.5	2	2.9	2	2.9

Since the income data were adjusted for family size, this might be expected. Younger and older operators would tend to have smaller families to support, though for different reasons. There were no appreciable age differences between Classes B and C. Both distributions approached the normal.[1]

It has been shown that large differences existed in the incomes received by farmers in the various income groups. What has the Agricul-

[1] Witt (43) and Stillman (33) concluded that "low-income" farmers were generally in the younger and older age groups, which is in a relative sense, the reverse of the conclusion above. But this is readily explained by the differences in definition of "low-income". Witt and Stillman also employed a form of statistical designation, but they made no adjustment for family size. The difference can be accounted for on this score, since, as will be pointed out later, the conclusion in terms of the production concept is the same in this study as in those by Witt and Stillman.

tural Adjustment Administration done in orienting these differences? The purposes of the AAA program have presumably been (1) adjustment of agricultural resources for the purpose of increasing future incomes and (2) increasing present incomes by allotment and parity payments, and the loan program.[1] Witt (43) has shown that government payments under the AAA have been allotted in the main on the basis of resources, those farmers having large businesses and accompanying incomes receiving the largest government payments.

Is the picture appreciably different if an adjustment for family size is employed in the designation of low-income. Since family size does not vary directly with the quantity of resources engaged in production, the association between AAA payments and income per adult equivalent would not be as large as if no adjustment had been made.[2] While the adjustment reduces the differences, they remain large and in the main reflect the great variations in the quantity of land resources among the income groups. (Table 4)

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[1] There is considerable reason for believing that the means employed in the attainment of these ends are not consistent with one another. The implications have been discussed by others (29).

[2] On the basis of a division of the array of net farm income (exclusive of AAA payments, the mean government payment on the 1941 sample ran from high to low, $327, $215 and $128, while in terms of income classes established from the array of average operator's net income per adult equivalent, the 1941 payments were $317, $208 and $153. While the group differences are still large and significant, the adjustment makes for more equality.

Because families are larger in the low-income group, the absolute differences, as measured by the size of the AAA payment per family (operator), do not indicate the inequalities in terms of people (Table 4). On the basis of group means, low-income families received a payment about 48 per cent as large as families in Class A. If the size of the payment is adjusted for differences in the potential power of the family to consume (adult consumption equivalents), the amount received by the low-income group was only 26 per cent as large.[1]

The regression of income per adult equivalent on the size of the AAA payment shows significant group differences (Table 6). On the average, families in the highest income group had an increase in income per adult equivalent of $2.85 associated with an increase of one dollar in AAA payments, while families in the low-income group had an increase of but 37 cents.

In terms of adult equivalents, AAA expanded the income of Class A families $148 and Class C families $39. In plain dollars and cents, government payments increased the unequal distribution of income. Percentagewise, payments were a larger proportion of the income of Class C farmers. If there had been no AAA, low-income farmers would have lost a larger part of their income. There can be little doubt that families in Class C were in a better position because of AAA, but this does not

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[1] If families in the low-income group had received the payment going to Class A families, low-income families would have received about $80 per adult equivalent. If the high income group had received the Class C payment, it would have amounted to about $75 per adult equivalent.

Table 6. Relation of Operator's Net Income per Adult Equivalent (y) to the Size of the AAA Payment (x), by Income Classes, 1941

	Income class[1]			
	A	B	C	Significance
Correlation coefficient[2]	0.426	0.318	0.286	*
Regression coefficient	$ 2.85	$ 0.52	$ 0.37	*

[1]Income class refers to the division of the array of average (1939 and 1941) operator's net income per adult equivalent.

[2]r-values for each group were significantly greater than zero.

*Group differences significant at the 5 per cent level.

mean that their position could not have been enhanced even more by a more equal allocation of payments. It is possible that even the small payments received by low-income families meant more to them than the much larger payments received by the high income group.[1] If this were true, the inequality in terms of "satisfaction" would be less than without AAA. It seems more reasonable to assume that in totality the larger payment meant more to the high income farmers, but relative to size it gave great "satisfactions" to the low income group. This would prepare the way for an increase in total "satisfactions" with greater equality in allocation.

Family living from the farm

The question arises, do farm families with high incomes relative to their size (in terms of adult consumption units) produce more products for

[1]Subjectively, in terms of what they considered relevant.

home use than low-income families?

First to consider is the value of home-used farm products per family regardless of size.[1] In 1941 families in Class A used an average of $165 worth of farm products in the home as compared with about $206 for Class C. This suggests that low-income families were using more home-produced farm products.[2] But families in the low-income group were significantly larger. If sufficiently larger, it would mean that the amount of farm products used in the home was less per adult equivalent. Actually this seems to have been the case. In Table 7 are shown quantities and values of home-used farm products per family and per adult equivalent.

While the total value of home-used farm products was about 20 per cent more per family for the low-income group, the average value per adult equivalent was significantly smaller. The picture is even more extreme in the case of home-used livestock (meat). Not only was the total value of livestock less, but since families were larger, the value per adult equivalent was even lower.

Families in the low-income group reported using slightly more eggs,

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[1]The value of home-grown fruits and vegetables other than those canned was omitted because the estimates were considered too unreliable. See Appendix A for content of "home-used" products.

[2]Witt (43) found that his high income farmers were using more home-produced products, especially meat and livestock products. His definition of low income did not consider family size and this no doubt accounts for the difference, since in terms of the production concept farmers in the highest one-third of the array of net farm income produced significantly greater amounts for home use in 1941.

Table 7. Values and Quantities of Home-Used Farm Products, by Income Classes, 1941

	Income class[1]			Significance
	A	B	C	
Average operator's net income per adult equivalent	$ 1520	$ 594	$ 275	No test
Size of family (adult equivalents)	2.14	3.18	3.88	**
Value of home-used products per family[2]	$ 154	$ 191	$ 206	No test
Value of home-used products per adult equivalent	$ 78	$ 60	$ 53	**
Value of home-used livestock (meat) per family	$ 71	$ 67	$ 55	No test
Value of home-used livestock (meat) per adult equivalent	$ 34	$ 22	$ 15	**
Number of quarts of fruit and vegetables canned	121	166	199	**
Number of dozens of eggs	141	148	156	No test

[1]Income classes refer to the division of the array of average (1939 and 1941) operator's net income per adult equivalent.

[2]Does not include operator's estimate of value of fruits and vegetables other than those canned.

**Group differences significant at the 1 per cent level.

but not enough more to offset the larger size family.[1] High-income families canned a significantly smaller quantity of home-grown fruits and vegetables, only about 60 per cent as much as low-income families. Yet,

[1]It is estimated that in 1939 families in Class A used an average of 159 dozens of eggs, compared with 165 for Class B and 184 for Class C. In both 1939 and 1941 the class differences in pounds of butterfat used in the home were not appreciable, but differences in family size would suggest that the low-income group used substantially less per adult equivalent.

low-income families did not can any more per adult equivalent, probably somewhat less.

The overall conclusion seems to be about this. While low-income families were producing more farm products for home use, they did not produce an amount sufficient to enable them to maintain a rate of consumption equal to that for the high income groups. It is possible, of course, that supplementary purchases might have offset this. But their incomes were so much lower that this seems unlikely. A part of the smaller consumption was probably a result of a pressure for cash income, consequently, sales of livestock and livestock products were larger. Some of this might otherwise have been used in the home.

Medical care

Family heads were asked to estimate the amount spent on medical and dental care in the past three years. The high income group spent an average of $168 per family; the middle group, $154; and the low-income group, $125. While these differences seem appreciable and were consistent, they were not significant. It is quite probable that if the values had been adjusted for family size, the expenditures per adult equivalent would have been significant. On the basis of group means, families in Class A spent about 2.4 times more per adult equivalent than families in Class C.

Medical and dental expenditures should be related to probable differences in "need" arising out of age differences. Since proportionally

more of the operators in Class A were in the younger and older age groups, their medical and dental demands may have been somewhat higher. The derivation of the adult consumption units takes into account at least a part of these differences.[1] The effect, therefore, of the distribution of operators' ages, through size and composition of the family, was probably not appreciable. Consequently, it seems evident that low-income families were receiving less adequate medical care.[2]

Home conveniences and dwelling

Do farm families in the low-income class have as many of the more common home conveniences as those in the higher income groups? Does the amount of their income relative to the more essential consumption requirements limit their ownership of these items? Some light is thrown upon these questions in Table 8.

Practically all the families in the sample owned a radio, although occasionally a farmer in the low-income group stated his set was poor or not in operating condition. Income deficiency does not seem to have been an important factor hampering the ownership of radios, though it probably did affect the quality of the set owned.

The last decade has seen a rapid extension of rural electrification, largely through the efforts of the REA. But income still seems to be

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[1]See Appendix B.

[2]Observations made by enumerators would tend to support this conclusion.

Table 8. Percentage of Farm Families Having Selected Home Conveniences and the Value of the Farm Dwelling, by Income Classes, 1941

	Income class[1]			Significance[2]
	A	B	C	
Number of families	66	66	66	
Percent owning:				
Radio	100.0	98.5	100.0	***
Electricity	72.7	50.0	41.2	**
Telephone	90.9	76.5	58.8	**
Running water	39.4	29.4	16.2	*
Refrigerator	54.5	35.3	27.9	**
Value of dwelling[3]	$ 2756	$2202	$2062	***

[1]Income classes refer to the division of the array of average (1939 and 1941) operator's net income per adult equivalent.

[2]Test of significance was based upon numbers rather than percentages.

[3]Test of significance gave an P-value just slightly less than that at the 5 per cent level, a borderline case.

*Group differences significant at the 5 per cent level.

**Group differences significant at the 1 per cent level.

***Group differences not significant.

an important limiting factor. Highly significant group differences were found to exist for the number of families having electricity. While about 73 per cent of the high income group reported electricity in the home, only about 41 per cent of the low-income group were provided with electric power. A part of this difference is associated with the significantly larger number of tenants in the low-income group, since landlords are usually hesitant about wiring the farm house.

Many more Iowa farmers had telephones than electricity, but limited income seems to remain an important deterrent. The differences among income groups were relatively large and highly significant. About 91 per cent of the farmers in Class A reported telephones as compared to 59 per cent in the low-income group.

Electricity was more common on Iowa farms than refrigerators but high income families had a significantly larger proportion of the total number in use. Only about half as many low-income families had refrigerators as high income families.

Of the selected group of home conveniences, running water in the home was the least common among farm families in the sample. This fact is no doubt related to the greater cost which would usually accompany the installation of this convenience. Significantly fewer low income families possessed running water in the home. Again the group differences reflect, in part, differences in tenure. Landlords are generally reluctant to make large fixed investments in facilities which are largely for consumption by the tenant family, even more so than in the case of production

facilities. Lease terms are too short to enable the tenant to use up his investment in fixed consumption goods, and few contracts carry stipulations allowing recovery on any unused portion of a consumption facility attached to the "land" (house). Consequently, if tenants did have the money to spend, they could not be expected to make commitments in this direction.

The differences in tenure would also be reflected in housing facilities. The operator's estimates of the value of the farm home are probably subject to important error. It is likely that this looms largest in terms of absolute values rather than in inter-class comparisons. Tenure biases are also likely to enter. But the group differences suggest that low-income families were in possession of poorer housing facilities.[1]

It is evident that low-income families had fewer home conveniences. Relative to other groups, their deficiencies seemed to be greatest in refrigerators, running water and electricity, least in radios and telephones. In terms of family size, it means that even fewer rural people had the advantages of these facilities than is indicated, since low-income families were significantly larger.

Miscellaneous items

Questions were asked the family head about the use of the radio and magazine and newspaper subscriptions. These are summarized in Table 9.

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[1]The test of significance provided an F-value on the border of significance, being only slightly less than the tabular value at the 5 per cent level.

Table 9. Radio Use and Newspaper and Magazine Subscriptions, by Income Classes, 1941

	Income classes[1]			
	A	B	C	Significance
Farmers listening to news broadcasts (per cent)	91.0	88.0	86.8	***
Farmers listening to market broadcasts (per cent)	82.1	77.3	76.5	***
Average number of newspapers taken	1.7	1.5	1.4	No test
Average number of farm magazines taken	2.4	2.1	2.0	No test
Average number of other magazines taken	1.3	1.5	0.8	No test

[1]Income classes refer to the division of the array of average (1939 and 1941) operator's net income per adult equivalent.

***Group differences not significant at the 5 per cent level.

A somewhat larger proportion of the operators in each income group reported listening to news broadcasts than to market broadcasts. While slightly fewer low-income farmers stated they listened to news and market broadcasts, the group differences were not significant. They were too small to be of any consequence.

Among newspapers and magazines, farm journals seem to be most popular in all income groups, at least in terms of numbers. Low-income families averaged consistently fewer newspapers, farm journals and other magazines.[1]

[1]No test was employed to determine the significance of these differences.

There were no appreciable group differences in the ownership of automobiles, although fewer low-income farmers owned a truck (Table 10). The automobiles in the low-income group were older and generally of a less costly kind. The estimates made by the operators of the miles traveled by car in 1941 show that high income farmers used their cars somewhat more than those in the low-income group, yet the differences are not as large as might be expected. Could this possibly point to a somewhat greater relative drain on incomes in Class C? Possibly it does. If so, it might suggest that there is less practice of frugality among low-income farmers as a whole. Further research would be necessary to support or reject this hypothesis.

Income, Capital Accumulation and Net Worth

Like all receivers of income the farmer makes a choice between consumption and savings. Given an amount of income, the more he spends for consumption, the less he has left for savings; the more he saves, the less remains for consumption. But in contrast to the salary or wage earner, the relation is of more practical significance to the farmer. The laborer usually contributes only his brawn and brains to the productive process in which he is employed, leaving the capital contribution to others, but the farmer provides, along with his brawn and mental qualities, a large part of the capital involved.[1] The

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[1] In theory, under the assumption of perfect competition, there would occur no difference in the rate of return to comparable resources in alternative employments under equilibrium conditions. The human contribution in agriculture would presumably be valued at a price similar to the human contribution in industry when of like quantity and quality. The practical significance of this difference is related to factors of immobility and uncertainty. In theory, differences in income would then be affected only by the ownership of resources.

Table 10. Number of Automobiles and Trucks, Age and Miles Traveled in 1941, by Income Classes

	Income class[1]		
	A	B	C
Number of farmers	67	68	68
Number owning an automobile	64	66	65
Age of automobile (years)	4.7	5.7	6.8
Miles traveled	6281	5468	5441
Number owning a truck	10	7	6
Number owning neither truck nor automobile	0	0	2
Age of truck (years)	6.1	6.4	6.5

[1]Income classes refer to the division of the array of average (1939 and 1941) operator's net income per adult equivalent.

relationship is of particular importance in low-income agriculture.

Aside from borrowed and inherited capital, the farmer must accumulate his resources through a process of saving which is dependent upon the size of his income and the level of family consumption. But the importance of the relation between income and capital does not stop here. The farmer's income is not only dependent upon price and cost relationships, but also on the scale of operations, the combination of productive agents and his contribution to the productive process in terms of resources. The scale and efficiency of operations is dependent in part upon the availability of resources or capital. A limitation of owned capital or borrowed capital, when its marginal efficiency is in excess of its cost, will limit his income. With a given level of consumption this in turn

will limit his future ability to accumulate capital and thus the circle proceeds. Under favorable cost and price relationships, the farmer who early in life is able to increase his investment through savings, inheritance or profitable borrowings, will find his income increasing, making additional investment and consumption less difficult.

What factors enter a farmer's decision to save or spend? Empirical evidence is scarce. The problem has been largely neglected, possibly as a result of the static approach (analysis of one-year records) to the problems in farm management in which processes through time have received but minor attention.[1] Certain overall considerations provide some basis for answering the question. Probably foremost in the mind of the farmer are: (1) the amount of his income, (2) the value placed upon or the pressure for present consumption, and (3) the value attached to uncertain future income for purposes of future consumption and savings. Since these factors vary greatly among farmers, their relative importance is difficult to assess. It seems likely that income and the pressure for present consumption are most crucial. In this the element of frugality plays a significant part. To what extent "careless" spending limits capital accumulation is a question of fact, once this type of spending has been clearly defined, but we have been unable to uncover any reliable empirical evidence which might have a bearing on this point.

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[1] A step toward process analysis is contained in J.A. Hopkins' recent publication dealing with trends over a 20-year period on record farms (13).

The proportion of income spent for present consumption will be dependent upon the farmer's willingness or ability to forego a higher level of living now for an uncertain expectation of a continuously higher level of living in the future. But there is a limit to the extent which a farm family can reduce present consumption in order to accumulate capital. The pressure for spending is great when there is little or no excess of income over the cost of living "necessities". As income falls the proportion available for savings declines until finally all of income is utilized for consumption. For the farm family whose income has been relatively high, retrenchment is possible. But if income is still insufficient for the "necessary minimum of essential products," depletion of capital (liquid and fixed) may occur. In order to continue farming operations with the expectation of more abundant returns in the future, capital depletion and a lowering of living levels to rock bottom have frequently been necessary.

The implication to low-income agriculture should be clear. It is simply this: farm families whose incomes are low in relation to consumption "requirements",[1] are unable to accumulate sufficient capital to enlarge their operations and thereby increase their incomes. If they are unwilling or unable to borrow capital whose marginal efficiency is greater than cost, their future ability to accumulate is not increased.

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[1]This would usually be considered in terms of the family's appraisal of what is necessary for consumption. But as this level is lowered the limits of variation are reduced until some sort of minimum is reached which is necessary for the maintenance of life.

and as a consequence they continue to operate on a small scale. This phenomenon does not provide by any means the whole explanation for low-income, but it does suggest a goodly part of it, though in a superficial sense.

As applied to the problem in Iowa, Table 11 provides some evidence of the interrelationships of income, "capital" expenditure and net worth. Income is measured by the average (1939 and 1941) operator's net income per adult equivalent. This provides an approximation of the amount of income relative to the potential power of the family to consume. It might be expected that farmers with high incomes per adult consumption equivalent would be in a better position to invest in the farm business. Of course, this is true only if consumption does not increase proportionally. "Capital" expenditures, which are really inputs, were measured by the expenditure made during 1939 and 1941 for lime, fertilizer, legume and grass seed, repairs and new improvements, livestock, machinery and land (actual). The net worth figures apply to the value of all owned (equity) assets as of January, 1942.

Highly significant group differences were found for "capital" expenditure when sorted by income per adult equivalent. While these differences were large, there occurred a substantial amount of variation within groups. The farmers in each income class were again divided into two sub-groups on the basis of the array of "capital" expenditures. The results indicate that while the highest one-half in "capital" expenditure in Class A spent about 7.8 times more than the lowest one-half,

Table 11. "Capital" Expenditure, Net Worth, and Operator's Net Income per Adult Equivalent, Sorted by Average Operator's Net Income per Adult Equivalent[1]

	Operator's net income per adult equivalent	"Capital" expenditure	Net worth
Class A[2]	$ 1,517	$ 3,726**	$16,994**
High half in "capital" expenditure	$ 1,832	$ 6,680	$20,452
Low half in "capital" expenditure	$ 1,212	$ 858	$13,638
Class B[3]	$ 597	$ 1,937**	$ 9,926**
High half in "capital" expenditure	$ 600	$ 3,327	$13,173
Low half in "capital" expenditure	$ 593	$ 505	$ 6,580
Class C[4]	$ 278	$ 1,379**	$ 6,413**
High half in "capital" expenditure	$ 277	$ 2,540	$ 8,243
Low half in "capital" expenditure	$ 278	$ 259	$ 4,634

[1]"Capital" expenditure includes the money estimated to have been spent during 1939 and 1941 on the following items: lime, fertilizer, legume and grass seed, building repair and new improvements, livestock, machinery and land. Net worth value is estimated as of January 1, 1942. Average operator's net income per adult equivalent refers to the average of the values for 1939 and 1941.

[2]Highest one-third of the array of average operator's net income per adult equivalent.

[3]Middle one-third of the array of average operator's net income per adult equivalent.

[4]Lowest one-third of the array of average operator's net income per adult equivalent.

**Group difference significant at the 1 per cent level.

their income per adult equivalent was only 1.5 times greater. In Classes B and C the "capital" expenditure of the highest one-half group was also several times that of the lowest, yet incomes per adult equivalent did not average appreciably higher for the groups having the largest "capital" expenditure. The highest one-half of Class B spent about 3.9 times more than the lowest half of Class A, but had incomes averaging only half as much. The same applied to the highest one-half of Class C as compared with the lowest one-half of Class B.

The interrelated effects between income and capital expenditure make it impossible to separate out the influences of income on capital expenditure and capital expenditure on income, since the relations run both ways. Farmers with high incomes relative to family size can spend more for capital inputs and thereby can have larger incomes. Because of larger capital inputs, from say, borrowings or past income, they secure larger incomes and have more available for capital expenditure in the next period. It is evident that other important factors enter the picture, such as variations in (1) levels of consumption, (2) capital borrowing and debt repayments, (3) cash reserves and (4) non-farm investments. In addition, there are other influences which jointly affect the amount of income. For instance, the significant class differences for acres in crops mean that the output of cash and feed crops is also higher for Class A.

Turning to the relationship of income, "capital" expenditure and net worth, the overall conclusion seems to be that variations in capital expenditure were more closely associated with net worth than with income

per adult equivalent. This seems to be evident for all income groups. The values of net worth were significantly greater for the higher income classes, suggesting that high income per adult equivalent was conducive to a larger capital accumulation and further, that because of a larger net worth, incomes were also higher. It might be that the closer association between net worth and capital expenditure indicates the importance of scale in relation to capital inputs or capital borrowings. In banking circles the man with property has the advantage. The ratios of "capital" expenditure to net worth were practically the same for the high and low income groups. The group means indicate that the low-income group spent about twice the proportion of its income for "capital" input as compared with Class A.

In general, the evidence suggests that the rate of "capital" expenditure, the value of net worth and the flow of income per adult equivalent are all associated in an interrelated fashion, in which the growth of one tends to increase the magnitude of the others. The low-income group was characterized by smaller "capital" expenditure and net worth, the size of income being so small relative to consumption that it permitted relatively limited capital accumulation. The value of net worth was such as to have permitted only smaller borrowings, even under the assumption of a willingness to borrow. These factors would tend to perpetuate a relatively smaller scale of operations among low-income farmers. Other related factors will be considered in a later section.

INCOME STABILITY

Of fundamental importance to the low-income problem in terms of either the production or consumption concept is the degree of relative income stability. One is well aware of the fact that farm incomes fluctuate violently. In agriculture these fluctuations are related in the main to price changes, although important changes in the volume of physical production have entered the picture at times. In the sample under consideration, it is estimated that between 1939 and 1941 operators increased their net incomes by about one and one-half times, from an average of $1165 in 1939 to $3000 in 1941.

Much less is known about the relative movements of farm incomes within agriculture. For example, do farmers in the lower decile of the income array remain in about the same relative position year after year, or is there a substantial movement up and down the array? Available data are not sufficient to answer this question, yet they may prove suggestive.

Immediately one is faced with the problem of measuring the relative change. The common method of grouping, when applied to ranks, causes a bias. The ends of the array provide limits resulting in skewed distributions. For an overall measure of the change in position, rank

correlation was employed. When the 204 farmers in the sample were arrayed on the basis of (1) 1939 operator's net income, and (2) 1941 operator's net income, given ranks ranging from 1 to 204, the coefficient of rank correlation provided a measurement of the association of ranks.[1] The coefficient was found to be + 0.50 (S.E. 0.07), indicating that farmers who ranked high in 1939 incomes also tended to be high in 1941, but with an appreciable change in the relative position of individual farmers. The nature of the measurement is such that it does not tell whether the movement was extreme for but a few operators or whether it was small for many. Neither does it indicate the relative movement in different parts of the array.

In an attempt to obtain a rough indication of the relative movement in different parts of the array, the 1939 array was divided into halves, each half then being handled in a fashion similar to the overall array. The upper half of the array had a rank correlation coefficient of + 0.446 as compared to + 0.212 for the lower half. The difference was not significant at the conventional 5 per cent level, but the probability was small that the difference reflected sampling error.[2]

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[1] The coefficient has a possible range of positive to negative unity. If 1939 and 1941 ranks had all been the same, the coefficient would be equal to positive unity, and if completely reversed, negative unity.

[2] The t-test was employed to test the significance of the difference. Since the coefficients do not tend to be distributed normally in small samples with population values larger than zero, Fisher's z transformation was made. t equaled approximately 1.86. With 198 degrees of freedom this provided a probability value of approximately .07.

The larger positional change which seems to have occurred in the lower half of the array may be a phenomenon common only to the two years studied. The variation may well have been something different if other years had been employed. It is interesting to note that the farmer who had the smallest income in 1939 had the highest income in 1941. He operated a large cattle feeding enterprise. His cost-price relationships were unfavorable in 1939 but extremely favorable in 1941. As a result of this and expanded operations, he was able to increase his net income several fold. Inclusion of a relatively few farmers who experienced similar changes in income might readily account for the larger variation in the lower half of the array. If the base year had been 1941 instead of 1939, the coefficient might have been smaller in the upper half. It is therefore probable that these data do not provide a safe basis for generalization.

If a study over several years should show a similar difference in variability, one would be on safer ground in concluding that variation in position was larger in the lower portions of the income array. Such an occurrence might be explained by the fact that high income farmers are better all around managers and therefore adapt themselves more readily to changing economic conditions. As a result, they have more stable incomes.

THE RELATION BETWEEN THE DESIGNATIONS OF "LOW-INCOME"

In the process of the study two different types of low-income designation were employed. The statistical designation used in the analysis of the consumption concept is familiar. It consisted of the lowest tertial division of the array of average (1939 and 1941) operator's net income per adult equivalent. In the subsequent analysis of the production concept, the low-income group has been defined as including all those farmers in the lowest tertial division of the array of 1941 operator's net farm income.[1]

Before proceeding to the production concept, it is of interest to know what effect the two different designations of low income had upon the composition of the income groups. If the production and consumption concepts had clear and concise standards of measurements, it would be relatively simple to show the relationships between the two groups established on the basis of (1) consumption inadequacy and (2) uneconomic use of resources. In terms of action programs these relationships are important, since the means employed in achieving one may be something quite different than employed to gain the other. In addition, the means may not be consistent in the simultaneous

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[1] See Appendix A for the content of net farm income.

achievement of each end. A government program may have a quite different social raison d'etre when applied to the "resource and income" problems.[1]

By setting up a tabulation as found in Table 12, it is possible to obtain a general idea of the effect on the composition of the income groups of employing the two designations of low-income. In each case the arrays have been divided into approximately equal groups. First the 203 farmers were sorted into income groups on the basis of the average (1939 and 1941) average operator's net income per adult equivalent. The number of farmers in each class who also fell in that class on the basis of 1941 net farm income was then determined.

Of the 67 operators falling in the highest one-third group (Class A) on the basis of income per adult equivalent, 61 per cent fell in the highest tertial group on the basis of net farm income. For Class B, the figure was 46 per cent and for Class C, 66 per cent. Eight per cent of the low-income group on the basis of income per adult equivalent was in the high income group on the basis of net farm income. Twenty-six per cent was in the middle group. The variation in the designation of low-income had a substantial effect on the composition of the income groups.

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[1] A certain type of public action for the purpose of obtaining a better use of resources might be something quite different than that condoned for the purpose of providing "adequate" incomes. A striking example is found during the prosecution of war.

Table 12. Relation of Income Classes Established from Average Operator's Net Income per Adult Equivalent and Net Farm Income[1]

1941 net farm income class	Average (1939 and 1941) Operator's net income per adult equivalent							
	Class A		Class B		Class C		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
A	41	61	21	31	5	8	67	100
B	19	28	31	46	18	26	68	100
C	7	11	16	23	45	66	68	100
Total	67	100	68	100	68	100	203	

[1]The income class designations, A, B and C, refer to the highest, middle and lowest tertial divisions of the income array.

The effect of the adjustment in family size is suggested in Table 13. On the basis of the income groups established from the array of average operator's net income per adult equivalent, the group regressions of operator's net income per adult equivalent (1941) on operator's net income (1941) were determined. The regression coefficient for the low-income group was significantly smaller. An increase of one dollar in operator's net income was associated with an increase in operator's net income per adult equivalent of 8 cents for the low-income group, 11 cents for the middle group and 32 cents for the high income group. The standard errors of the regression coefficients and the correlation coefficients indicate the higher association in the high income groups. The smaller size families in the higher income classes had less effect on the adjusted incomes.

Table 13. Relation of Operator's Net Income per Adult Equivalent (1941) (y) to Operator's Net Income (1941) (x), Sorted by Average (1939 and 1941) Operator's Net Income per Adult Equivalent

	Income class		
	A	B	C
Operator's net income per adult equivalent	$ 2158	$ 839	$ 424
Operator's net income	$ 4690	$ 2676	$ 1626
Regression of y on x	.518	.118	.085[1]
Standard error of regression coefficient	.0177	.0178	.017
Correlation coefficient	.912	.633	.515

[1]Group differences significant at the 1 per cent level.

THE PRODUCTION CONCEPT OF LOW-INCOME IN IOWA AGRICULTURE

The problems involved in an analysis of the production concept are concerned with the use of resources. The overall query is this: Are the farmers under consideration operating units in which all resources, land, labor, capital and entrepreneurship are employed in the most economical manner.[1]

An analysis of the production concept alone cannot answer the question whether or not a more economical use of resources will furnish an income adequate for the attainment of a socially desirable minimum level of living. In the United States there are, no doubt, many farmers who do not at present possess the necessary requirements for the operation of a farm whose size and organization would provide an "adequate" income. An optimum firm commensurate with their managerial ability may still be too small. In addition, the problem of resource ownership

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[1]The concept of economy inferred here is that of maximizing the end (assumed to be market value income) by the appropriate use of means (resources). The assumption that all farmers endeavor to obtain the largest possible market-value income (net) from their resources is open to question. It probably comes nearest to approaching the facts for highly commercialized operators whose labor and entrepreneurial capabilities are not sacrificed for "large" amounts of leisure and whose "needs" are relatively great. Even with these farmers, there may be important compromises in the use of resources for the attainment of non-market ends. (See section "A note on the use of economic analysis".) The "low-income" farmer group is not homogeneous in this respect. Young and middle aged farmers in the low-income group who have important "needs" probably approach the assumption more closely than do older farmers who may be in a state of semi-retirement. In a positive sense this difficulty provides definite limitations to the use of an analytical model based on this assumption. In a normative sense, these limitations fade. (23)

is involved. The optimum firm may provide an "adequate" income, yet the farmer's contribution to the productive process may be small and consequently also his income.

A consideration of both the production and consumption concepts is essential. When it is apparent that with the "best" use of resources incomes are still too low, a further increase in income from farm resources is not economical. If incomes are increased by providing returns higher than dictated by productivity, it means that resources become poorly used. When higher incomes are necessary to provide for "adequate" levels of living, they should be increased in a fashion which does not in itself entail a misuse of resources, but which, if possible, can contribute to increasing future productivity. Only in this manner is it possible to achieve a maximum income from the nation's resources and provide "adequate" levels of living.[1]

Elsewhere it has been suggested that the optimum firm might provide a standard of measurement for comparative income analysis, if its empirical content was known. Without the optimum firm in reality, it is necessary to employ a substitute which at best is a poor one. By comparing groups of farmers having different levels of income, it is possible to discover some of the elements which are associated with these differences and may logically be expected to cause or explain them. The primary difficulties arise for want of adequate measurements.

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[1]The difficulties encountered in policy formulation along these lines have been discussed by T.W. Schultz (29).

The scheme of analysis and discussion will consider the following points in the order named: (1) the active factor in management and organization, entrepreneurship, (2) the supply and utilization of labor, and (3) land and capital. Since the earlier investigation by Witt (43) was concerned with these same aspects, those things in common will receive but passing attention, except when additional evidence is available or the present findings seem in conflict.

For analysis the 204 matched farmers were sorted into three equal groups by dividing the array of operator's net farm income at appropriate intervals.[1] For convenience the upper tertial group was designated Class A; the middle group Class B; and the lowest, Class C.[2]

In keeping with the production concept, operators in Class C will be referred to as low-income farmers. This implies that (1) the resources on these farms are not making their maximum contribution required for the greatest possible net income and/or (2) these farmers have contributed less to the production process in terms of resources. The designation is essentially a hypothesis.

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[1] Net farm income was employed since it was thought that this would provide a more accurate measurement of resource capacity and efficiency and the variation in factor ownership and control. It does not include income from AAA payments. These were omitted because, while related to resources, they contain a large element of subsidy. In addition, their omission gives greater comparability between cooperators and non-cooperators. See Appendix A for definition of net farm income.

[2] It should be remembered that these income classes differ from those employed in the analysis of the consumption concept. In 1941 operators in Class A received an average net farm income of $5019, compared to $2082 for Class B operators and $929 for farmers in Class C.

Entrepreneurship and Farm Practices

The decisions concerning farm operations and organization are made by the operator. It is he who determines the manner in which resources are to be employed, and to a great degree, the extent to which latent productivity is to be engrossed into product. Confronted with change, it is the operator who must decide what adjustments are necessary and how they are to be made. Decision-making may well be considered the paramount function of the entrepreneur. Like all conscious decisions they have their basis in acquired experience. Good business judgment seems to require some rather extraordinary talents, of which the ability to make a quick and accurate appraisal of a particular situation in which all the elements are given their proper weight, is not the least important. In addition, plain ordinary "drive" and the desire to get things done at the appropriate time fill an important place in the practical operation of a farm.

The many ramifications of entrepreneurship in agriculture are as yet largely unexplored. We have few adequate measurements in this area.[1] Presumably, without some basis, real or imaginary, for estimating the capabilities of the operator as a manager, we can draw no conclusion as to the under-employment of this factor, whether or not additional capital may be economically used.

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[1]The part played by entrepreneurship in its role as coordinating agent in the theory of the firm under dynamic conditions would seem to require the development of these measures if our theoretical models are going to be of much help in analyzing real problems (20).

Low-income operators have frequently been dismissed as poor managers, individuals with slip-shod methods, lacking initiative and imagination.[1] As a generalization applied to all low-income farmers, this is dangerous even for a static description. The belief that everyone will "succeed" if he has "it" in himself is just not true. The great variations in opportunities over time are sufficient argument to dispel this notion. Poor management may be an accurate explanation of the present low-income condition of some farmers, yet management is not a static thing. It is a factor subject to change and supplementation and affected by the principle of substitution. The management characteristic as lodged in the farm operator is not the same at age 25 as it is at age 45. Environment has an important influence, especially in the formative years in the acquisition of experience, education, health and a set of values.[2] The economist's tendency to approach the problem in terms of fixed conceptions seems to be misleading and unreal.

In the study of low income it is this general aspect of the problem which provides the greatest challenge to research. Nevertheless, it is felt that here the evidence is least sufficient.

Personal characteristics of the operators

Farmers in the low-income group (Class C) tended to be younger and older than operators in other income categories, though the average age

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[1] For the "individualistic" point of view see (42).

[2] The arguments, pro and con, of the importance of environment and heredity in determining a man's "success" in the production field are pertinent here.

was not significantly different (Table 14). This suggests that low-income was not as common a characteristic among farmers in the prime of their productive careers. Young operators are generally pinched for capital. They have not been operating sufficiently long to accumulate adequate machinery, power and livestock. The greater number of low-income farmers in the older age groups was in part a reflection of partial retirement from active life. They included a relatively large number of farmers whose children had grown up and left the farm. In addition to these two groups, there were those farmers, probably 40 per cent of the low-income group, whose age could not be expected to affect their low-income status. In this respect, they were similar to operators in the high income groups.

The effect of age is readily noticeable in the amount of farming experience possessed. About a fourth of the low-income group had farmed less than eight years, compared with 19 per cent in Class B and 14 per cent in Class A (Table 15). A smaller amount of farming experience might be expected to influence income through its effects on management and the accumulation of capital.

Low-income farmers as a whole had more experience as farm laborers before becoming operators. Almost 60 per cent of the farmers in Class C reported working for hire before operating on their own. The figures for Classes A and B were 32 and 35 per cent, respectively. Again, this difference is likely to be associated with a deficiency of capital.

Table 14. Age Distribution of Operators, by Income Classes, 1941

Year	Income class					
	A		B		C	
	Number	Per cent	Number	Per cent	Number	Per cent
20-27.9	1	1.5	1	1.5	5	7.5
28-35.9	11	16.4	11	16.2	12	17.8
36-43.9	5	7.5	18	26.4	5	7.5
44-51.9	19	28.3	17	25.0	14	20.9
52-59.9	17	25.4	13	19.1	14	20.9
60-67.9	8	11.9	6	8.8	13	19.4
68-75.9	6	9.0	2	3.0	2	3.0
76-83.9	0	0	0	0	2	3.0
Total	67	100.0	68	100.0	67	100.0
Average age	50.1		45.9		48.2***	

***Differences not significant at the 5 per cent level.

Table 15. Distribution of Years of Farming Experience, by Income Classes

Years	Income class					
	A		B		C	
	Number	Per cent	Number	Per cent	Number	Per cent
0- 7.9	9	13.6	13	19.4	17	25.0
8-15.9	11	16.7	11	16.4	10	14.7
16-23.9	16	24.3	17	25.4	11	16.2
24-31.9	14	21.2	20	29.8	15	22.0
32-39.9	8	12.1	1	1.5	7	10.3
40-47.9	7	10.6	5	7.5	8	11.8
48-55.9	1	1.5	0	0	0	0
Total	66	100.0	67	100.0	68	100.0
Average***	23.0		19.6		21.0	

***Group differences not significant at the 5 per cent level.

Traditionally, working as a farm laborer was a step in the "agricultural ladder" where young men accumulated money and experience to establish themselves on rented farms. There were no appreciable differences among the income groups as to the proportion of operators who were farm raised, indicating that experience was probably not the primary motive. As will be pointed out, a smaller number of low-income operators stated they farmed because of inheritance. These things suggest that low-income farmers had less access to capital when they began farming. Their families may have been less able to help them. Consequently, more of them had to work out as farm laborers.

A goodly amount of formal education is not essential to successful farming, yet it is probably helpful. There were no significant group differences for the average number of years of formal education complete by the operators. A frequency distribution of the years of formal schooling indicates that a somewhat larger proportion of low-income farmers completed high school and somewhat fewer, the eighth grade (Table 16).[1] The heavier concentrations at these points are no doubt a reflection of the age distribution and the expansion in educational opportunities which has occurred in recent years. In total the amount of formal education could not be considered an important differentiating characteristic.

Farmers were asked to state during which months they thought hog prices were generally highest and lowest, thinking that this might give

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[1]Since the number of operators in the frequency intervals is extremely small, the data are merely suggestive.

Table 16. Years of Formal Schooling of Operator, by Income Classes

Years	Income class					
	A		B		C	
	Number	Per cent	Number	Per cent	Number	Per cent
1- 2.9	1	1.5	0	0	0	0
3- 4.9	2	3.0	1	1.5	2	3.1
5- 6.9	1	1.5	1	1.5	5	7.7
7- 8.9	45	67.0	44	65.7	35	53.8
9-10.9	4	6.0	7	10.4	7	10.8
11-12.9	6	9.0	7	10.4	10	15.4
13-14.9	5	7.5	5	7.5	5	7.7
15-16.9	3	4.5	2	3.0	1	1.5
Total	67	100.0	67	100.0	65	100.0
Average***	8.9		9.1		8.9	

***Group differences not significant.

some indication of their market knowledge. In general, farmers had a rather good picture of the seasonal movement in prices, especially of the low months. There were no appreciable differences among the three income groups. Farmers in the low-income group had about as much knowledge of the hog market as high income farmers.

The condition of a man's health is an important factor in his ability to discharge the duties of a farmer. It is possible that low-income farmers are suffering from greater physical handicaps, or as a result of low-income, health disabilities are not cared for. In either case the effect on income is similar. About 34 per cent of the farmers in Class C reported health disabilities of one kind or another, compared with 22 per cent in Class B and 21 per cent in Class A. A summary of the operators' estimates of the amount of time lost because of illness shows that although a larger number of the low-income group reported health disabilities, the amount of working time lost was not appreciably greater. Occasionally a low-income farmer commented to the effect that even when sick he continued to do his work. This may not have been as true for other groups.

In an endeavor to obtain some indication of the operator's interest in farming as an occupation, several related questions were included in the schedule. "Personal preference" was the chief reason for farming given by operators in all income classes; training was next in importance and farm inheritance, third.(Table 17) There was no clearcut evidence that more low-income operators were farming for lack of alternative

Table 17. Percentage of Operators Farming for Different Reasons, by Income Classes[1]

	Income class		
	A	B	C
Number of operators	65	67	67
Personal preference	54	60	64
Training	40	37	39
Inherited farm	29	16	12
Health	0	0	8
No other job	6	12	10
Married girl with farm	2	6	4
Other[2]	5	0	6

[1]Since some operators reported more than one reason the percentages do not total 100.

[2]Includes "independent life," "father wanted me to farm", "stumbled into it", and "wife wanted to farm".

opportunities. Few indicated they farmed because of no other job, but it is probable that some who stated they farmed because of training were really farming because they had nothing else to do. Somewhat fewer low-income farmers were operating because of inheritance. Only in the low-income group did any farmers state they farmed for reasons of health.

No significant group differences were evident in the preferences operators had for a non-farm occupation, to live in the city with the

same income as on the farm, or for some other type of farming. Low-income operators reported a greater desire for a different farm location. This in part reflected the larger number of tenants and the somewhat poorer land in the low-income group. Occasional statements by tenants also suggested some dissatisfaction with prevailing landlord-tenant relationships.

While small group differences were found in the participation of farmers in county agent and extension activities, they were neither consistent nor significant. There was some intimation that low-income operators were less disposed to believe in the educational activities of these agencies, but there was no great difference in this respect.[1] Somewhat fewer low-income farmers participated in the AAA program in 1941, but the differences were not significant.

Farm practices

The practices followed by a farmer in the operation of a farm are generally the result of a combination of circumstances. Only a few practices of a more general nature can stand equal application even on farms as homogeneous as those in Iowa. Some have alternatives which

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[1] Witt (43) concluded that the Extension Service was "providing much more service for the top income farmers." The evidence in 1941 does not indicate an appreciable difference. Witt did not have comparable data for the higher income groups, but drew his inference from the fact that 80 per cent of his low-income group had no contact with the county agent. In 1941 about 30 per cent of the Class A farmers reported contacting the county agent as compared with 25 per cent for both Class B and Class C.

provide results of comparability, yet require different amounts of effort from the operator and different types of capital facilities. The reasons why a farmer fails to follow certain practices applicable to his circumstance are many and varied. Some are related to lack of knowledge and experience; others are affected by tradition, inertia and habit. These might be considered associated with management. But there are others, such as feeding and breeding practices, which do not depend upon management wholly, but require capital outlays. Consequently, practices are only in part indicative of entrepreneurial capacity.

In group comparisons the difficulties encountered because of variability in application may be eliminated to some extent by selecting for analysis only practices of general application. Several questions more or less of this type are summarized in Table 18.

Low-income farmers do less planning of crop and livestock production than those in the high income groups. Group differences were significant but large only between Class C and Classes A and B. While relatively few farmers indicated they used systematic accounts, a majority kept some form of "record" which varied from double entry accounts to a glass jar in which income and expense statements were deposited. About 60 per cent of the operators in the low-income group reported the use of some kind of records, compared with 81 per cent of the farmers in Class A and 80 per cent of those in Class B. It was evident to the enumerators that heavier income taxes were causing a boom in record keeping.

Table 18. Use of Specified Farm Practices, by Income Classes, 1941

	Class A (per cent)	Class B (per cent)	Class C (per cent)	Significance
Planning of crop and livestock enterprises	80.6	80.0	64.7	**
Farm accounts (some kind)	88.2	76.5	60.3	No test
Use of purebred bull	78.8	72.7	55.6	**
Ownership of bull	86.4	75.0	63.5	*
Use of hybrid seed corn	98.5	100.0	94.0	***
Green manure crops plowed under	47.8	37.5	38.2	***
Per cent of crop land green manured (those reporting)	18.1	20.0	20.5	***
Treatment of seed oats	16.2	11.8	5.9	*
Per cent of crop land manured	18.0	19.5	17.9	***
Grain fed to cows on pasture	43.1	40.9	35.5	***

*Group differences significant at the 5 per cent level.

**Group differences significant at the 1 per cent level.

***Group differences not significant.

In respect to the cropping system, a somewhat larger number of operators in Class A plowed under green manure crops but the differences were not significant. Class C farmers plowed under smaller acreages of green manure crops but the amount plowed under as a per cent of total crop land was not significantly different.

While a measure of the intensity of manure applications is not available, operators in the low-income group reported manuring about the same percentage of their crop land.

Only a small proportion of the farmers in Iowa treat their seed oats. Yet the evidence indicates that of this group a larger proportion were high income farmers. Somewhat fewer low-income farmers used hybrid seed corn in 1941 but the differences were not large.

Low-income farmers were clearly behind in the use of pure bred bulls. The importance of milk cows in the type of farming most common among low-income farmers suggests that income might be increased appreciably by the use of better sires. Fewer low-income farmers owned their own bulls. This was associated in part with the smaller size of the livestock enterprise and insufficient investment capital. Without a substantial increase in the size of the herds, the most practical possibility of making available good bulls seems to exist in community cooperative projects.

Witt (43) found significant income group differences for the number of operators who feed protein hay. In the present survey low-income operators occasionally stated that they fed high protein hays when they were available but they were too costly to buy. Somewhat fewer low-income operators fed

grain to their milk cows while on pasture, but while the differences were consistent they were not significant. A remark quite common among low-income farmers was that they did not have enough grain for this purpose.

The survey schedule did not contain a distinct question on the vaccination of hogs. The enumerators were of the belief that low-income farmers vaccinated less frequently. The figures on pigs born and raised suggest that relative to the size of the hog enterprise low-income farmers lost a greater number of pigs. A significantly larger number of low-income operators reported their hog housing facilities inadequate, but a part of this effect was offset by later spring farrowings, reducing the chances of pneumonia and other diseases accompanying cold weather. The enumerators also felt that low income farmers had less realization of the importance of adequate feeding. It was thought that all too frequently they spread their available feed supply over too many head of stock, especially in the case of milk cows.

What can be concluded in respect to the managerial capacity of farmers in the low-income group? Two things seem certain; (1) the conclusion cannot be based upon a few particular characteristics, but must be related to an accumulation of many different factors, each in itself being relatively unimportant but essential to the whole; (2) the low-income group is not homogeneous in respect to management or the factors related to management. In the light of evidence presented and other impressions,[1] the "guess" is

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[1] Personal interviews and previous studies. See the section on "The Capital Problem" for the farmers' impressions of the factors limiting the size of their business.

that perhaps a third of the farmers in the low-income group are at present not subject to management limitations. This includes a larger proportion of the younger operators and some from the older age groups whose management capacity has never been given a try because of other circumstances. There is perhaps another 30 per cent who are limited by considerations of technical management, feeding, disease, rotation, et cetera. The remainder consists of a more heterogeneous group, a portion of which is limited by technical and organized management, some by a lack of "motivating power", others by distorted attitudes and traditions and probably a small proportion by what is commonly referred to as "inherent ability".[1] There seem to be few of these characteristics which are not subject to possible change, yet, some would require a great deal of effort extended over many generations.

Labor Supply and Utilization

In brief, the effective labor supply on a farm is dependent upon (1) the quantity of labor employed, and (2) its work intensity or the amount of accomplishment per unit of time. The last is affected in part by the efficiencies in the use of labor which accompany size of business and mechanization.

In Table 19 are shown the quantities of various types of labor employed by farmers in the three income groups.

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[1]Probably a function of both heredity and environment.

Table 19. Quantity of Labor of Various Types Used in 1941, by Income Classes

	Income class			Significance
	A	B	C	
Months of operator labor[1]	12.1	10.9	11.1	***
Months of family labor	5.1	3.5	1.7	**
Months of combined operator and family labor	17.1	14.4	12.8	**
Days of exchange labor	18.2	20.0	15.6	***
Expenditure on hired labor	$ 288	$ 138	$ 90	**
Months of hired labor	5.8	2.8	1.9	**
Total labor in 1941 (exchange labor omitted)	22.9	17.2	14.7	**

[1]Includes a few partnerships and family units with two or more men providing twelve months of operator labor.

**Differences significant at the 1 per cent level.

***Differences non-significant.

On the average, low-income farmers used less labor than operators in the higher income groups, only 64 per cent as much as those in Class A. In addition, significant differences existed in the composition of the labor force. While farmers in the low-income group worked about as many months on the farm, their labor consisted of about 76 per cent of the total labor force employed, compared to only 53 per cent for farmers in the high income group.

The amount of family labor was not only significantly smaller for low-income farmers but it also consisted of a smaller proportion of the labor force. Almost three-fourths of the low-income operators reported using no family at all compared with about 46 per cent of those in Class A. The large difference in the amount of family labor is explained largely by two factors. As we have indicated elsewhere, the age distribution for operators shows a proportionally larger number in the younger and older age groups. Operators in both are likely to have fewer children available for family labor, though for different reasons. Further, low-income farms have not provided as much employment opportunity and this has given children of low-income farmers a greater incentive to look for work off the home farm.

In Table 20 is shown the age distribution of the male family labor. In the main this is a reflection of the age distribution of the operators and employment opportunities on the home farm. Proportionally more of the male family labor available to the high income group was over 30 years of age. This is associated with the greater employment opportunity on these farms. A smaller proportion of the male family labor in Classes A

Table 20. Number of Farmers Reporting No Family Labor and Age Distribution of Male Family Labor, by Income Classes, 1941

	Class A	Class B	Class C
Number of farmers reporting	67	68	68
Number of farmers reporting no labor	31	34	50
Age distribution of male family labor[1]			
10-19.9	32	41	13
20-29.9	11	5	8
30 & over	16	4	4

[1]Includes sons and other male relatives.

and C was found in the age group 10 to 20 years, which is related to the higher proportion of older operators in these groups and of young operators in the low-income group. In each the majority of the male family workers was less than 20 years old.

Hired labor plays a more significant role on high income farms. Farmers in the low income group hired only about a third as much labor as Class A farmers. Furthermore, a larger proportion of the hire labor on high income farms consisted of yearly and monthly labor, while day labor was more important on low-income farms. About a fourth of the labor supply employed by the high income group was hired, but farmers in the low-income group hired only about 13 per cent of their labor force.

There were no significant group differences in the amount of machine and hand labor exchanged. Relative to the amount of work to be done (in terms of labor "requirement"), the low-income group exchanged more labor. It might be supposed that this was a result of a greater scarcity of labor on these farms. In the light of evidence to be presented, this seems doubtful. A more reasonable explanation might be in terms of a seasonal demand in which low-income farmers are less willing or capable of hiring labor, depending more upon exchange work. Since the estimates of exchange labor include machine work, a greater deficiency in certain types of machines may necessitate more exchange labor. Low income farmers had a somewhat lower average investment in machinery per crop acre, but while the differences were consistently lower, they were not significant (Table 33).

Family and operator labor potential

In an endeavor to obtain a picture of the available supply of operator and family labor independent of the reports of the operators, a potential was calculated by assigning a quantity of work to the operator and each family member, the size of the work assignment being dependent upon age and sex and school attendance in the case of children.[1] Two adjusted estimates were prepared. One was an adjustment for the operator's health, since some farmers in all groups indicated at least a partial loss of working

[1] A list of the work assignments is found in Appendix B.

time. The other was a composite adjustment for health and off-farm employment by the operator in 1941. These estimates are shown in Table 21. The adjusted estimates of labor potential were larger than the quantity reported actually used by all three groups. The potential adjusted for health was about 11 per cent greater than reported employed, approximately the same for each group.

Table 21. Family and Operator Labor Potential by Income Classes, 1941

	Income class		
	A	B	C
Unadjusted estimate of labor "potential" (months)	19.4	17.8	14.5
Estimate adjusted for health of operator (months)	18.4	17.0	13.8
Estimate adjusted for health and off-farm work (months)	17.8	16.5	13.1

Labor utilization

By relating the supply of labor employed to the amount of work accomplished, it is possible to obtain an estimate of labor efficiency. In a technical sense, labor efficiency should be measured as a ratio of output to input without a change in the technique of production or the combination of productive agents. In theory it should

be measured at the "highest profit" combination. In empirical studies this becomes impossible. What we have termed efficiency is in reality a composite of efficiency in the strict sense and intensity of labor use, influenced by not only differences in technique but the combination of productive agents as well.

In order to obtain an indication of the labor "demand", estimates of labor "requirements" were made for each farm in the sample. This was done by applying labor conversion factors to the acreages in various types of crops and the quantities of various kinds of livestock.[1] If we assume that labor is employed with equal efficiency on all farms at the level implicit in the conversion factors, the estimates of labor "requirements" provide a rough indication of the amount of labor necessary to do the crop and livestock work on these farms in 1941. The estimates are shown in Table 22.[2]

Since farms in the high income group averaged 120 acres larger than those in the low-income group, had a larger proportion of their acreage in important labor-consuming crops and possessed nearly three times as much livestock, the estimate of labor "requirements" on these

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[1] See Appendix B for conversion factors employed and their source. It is not to be inferred that the production of an acre of corn or a hundredweight of pork requires a given amount of labor without substitution effects. While this may be implicit in the use of conversion factors of this type, they are employed as a bench mark, their limitations being recognized.

[2] Farmers in all groups averaged about the same proportion of total labor "requirements" on crops and livestock, though chickens and milk cows were larger users of labor on low-income farms, while hogs were relatively much more important in the high income groups.

Table 22. Estimates of Labor "Requirements" by Income Classes, 1941

	Income class			Significance
	A	B	C	
Months of labor "required" for crops	7.7	5.1	3.6	
Months of labor "required" for livestock	15.2	10.8	7.1	
Total months of labor "requirement"	22.9	15.9	10.7	**

**Differences significant at the 1 per cent level.

farms was substantially larger. Considering the labor "requirements" for Class B as a base for comparison, the average "requirement" for farms in Class A was 44 per cent larger, while that for Class C was but 67 per cent as great.

What is the relation between the estimates of labor "requirements" and the quantity of labor reported used? A comparison of Tables 19 and 22 indicates that farmers in Class A employed a quantity of labor which on the average equaled the labor "requirement" on these farms. The equality was probably coincidental since both measures are but rough approximations. The overall efficiency implicit in the conversion factors is no doubt more representative of labor use on the high income farms. They were taken in the main from studies on record-keeping farms in the Corn Belt. For Class B farmers, the amount of labor reported employed was 8 per cent greater than the labor "requirement" while about

37 per cent more than the labor "requirement" on low income farms. If labor had been used as effectively on low income units as on the high income farms, Class C farmers could have handled about a third more crop and livestock work. Family and operator labor, while only about 80 per cent of the labor "requirement" for the high income group, was about 20 per cent more than the "requirement" on low income farms.

On the majority of Iowa farms, operator and family labor is usually sufficient to handle the livestock work. Hiredlabor, when employed, is used during the peak season for crop work. It is interesting to note that family and operator labor on low-income farms would have been 80 per cent more than sufficient to handle the livestock work if applied as efficiently as on high income farms. The estimates of family and operator labor potential hint of even a poorer utilization.

It seems clear that low-income farmers are not making as efficient use of their labor. But what factors are involved? Part of the relative under-employment was a result of a lack of productive work. Because low-income farmers were located on small units, they had less crop work to do. Their feed supply was more limited and their equipment less adequate, consequently they had less livestock. The livestock work was not sufficient to keep the operator and family fully employed the year around.

Another part of the "under-employment" was due to a lack of proficiency - wasted effort and slow and untimely performance of crop and livestock work. Technology is also involved. The smaller farms

are less adapted to mechanization, especially in crop work. It is also probable that insufficient capital has limited the process of mechanization more than could be expected because of size. Perhaps for some the value of leisure, especially to the older operators, limited their accomplishments.

It is difficult to assess the relative importance of these various factors without additional data of a type which is difficult to obtain. Among the younger operators it seems likely that a deficiency of crop and livestock work is of primary importance. In the middle age group, probably this and a lack of proficiency both loom large. For the older farmers health and leisure may take precedent. All are likely to be troubled with the mechanization problem. It seems highly probable that for a substantial portion of the low-income group there exists a labor supply which in the short-run is capable of more efficient use, if provided with proper incentives, capital facilities and some managerial assistance.

Farm Type

On the basis of criteria relating to (1) the proportion of feed unit production sold, and (2) the relative quantities of various kinds of livestock (in animal units), each farm in the sample was given a type designation.[1] Five farm types were employed: (1) Cash grain,

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[1] The complete criteria of classification are found in Appendix B.

(2) Hog, (3) Cattle, (4) Dairy, and (5) General. The type composition for each income class is found in Table 23.

Table 23. Distribution of Farm Types, by Income Classes, 1941

	Income class		
	A	B	C
Total number of farms	68	68	68
Hog farms	13	11	9
Dairy farms	8	16	21
Cattle farms	20	13	13
Cash grain farms	16	12	10
General farms	11	16	14

Significant group differences were found in type composition.[1] Differences were largest for the dairy, cash grain and hog types. In these cases consistent differences occurred. A larger proportion of the farms in the low-income group were of the dairy and general type, while the high income class was composed of a larger number of hog, cattle, and cash grain farms.

[1] More specifically, the test of significance provides what may be termed a borderline case. The chi-square value of 14.57 with 8 degrees of freedom is only slightly less than the tabular value at the conventional 5 per cent level (15.51). While a strict adherence to the convention would necessitate a statement of non-significance, the probability of differences as large as those existing as a result of chance is very little higher than .05.

A brief explanation of these differences is in order. The smaller number of hog farms in the low-income group was partly a consequence of the higher ratio of roughage to grain in the feed supply. A larger proportion of low income farmers are located in the Southern Pasture area, where soils are less fertile and topography is less conducive to grain production. This factor is probably more important on low-income farms than on others, since feed purchases are smaller, limiting the livestock production to the types capable of utilizing the feed output on the farm.[1] In addition, the problem of hog housing facilities presented a larger deterrent on low income farms.

In the classification of cattle farms the criteria made no differentiation between cattle feeding and cattle raising. The sample was considered too small for further subdivision. Beef raising is important in the Southern Pasture Area, largely a consequence of the hay and pasture supply. If more low-income farmers are located in this area one might expect a larger number of cattle farms in the low-income group. Cattle feeding is ordinarily considered a more risky business, employing relatively large amounts of capital; two good reasons why one might expect farmers with higher incomes to feed more cattle. Consequently, it is believed that the larger number of cattle farms in Class A as compared with Class C is a reflection of cattle feeding. The relative

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[1] In 1935 Wilcox (41) found that, in general, hog production was not highly associated with corn production, farmers raising the most corn per 100 acres were not raising the most hogs. In 1941 income group differences for the regression coefficients of the relation of hog income to feed unit production of grain were consistently larger when moving from the highest to the lowest income groups; but they were not significant.

importance of cattle within the low-income group is to be explained largely in terms of cattle raising farms.[1]

Dairying was the most common type of farming within the low-income group. The importance of dairying was probably the result of a combination of several factors, the feed and labor supply, demand for home used products (milk, cream and butter) and less specialization in which the dual purpose cow provided a fair veal calf and a quantity of milk.[2]

The limited quantity of feed production and the relatively larger available labor supply, requiring livestock for utilization, were probably the principal factors explaining the small number of cash grain farms in the low-income group.

Tenure

The size of the sample did not permit further division of the income classes by tenure without considerable effect on the stability of the means. But in order to be cognizant of any tenure differences which might affect the analysis, a brief account of the tenure aspect is desirable.

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[1] Witt (43) although employing somewhat different criteria found that in 1939 there were no commercial cattle feeding farms in his low-income group, while about 75 per cent of the feeder type farms were in his high income group.

[2] The classification of dairy farms was based on the proportion of total animal units in milk cows. It was quite evident to the enumerators that many of the cows reported milked were not dairy breeds. Occasionally beef cows were being milked. This fact places some doubt on comparisons between "dairy" farms in the low-income groups and those in Classes A and B.

Table 24 shows the number of owners, part-owners and renters in the three income classes in 1939 and 1941. About 48 per cent of the operators in the low-income group were renters in 1941, compared to 54 per cent for Class B, and 29 per cent for Class A. Group differences (numbers of owners and part-owners as compared to renters) were highly significant, though not consistent. This would tend to affect the validity of any statements relating to the association of tenure and income. It should be noted that the tenure differences are important only between Class A and Classes B and C.[1] It is likely that the effect of tenure upon income is confounded with other more important influences. There is some indication that inheritance played a more important role in the high income group. This and the fact that incomes in Class A have been higher would explain in part the larger proportion of owners in that group. As was pointed out earlier, the tenure differences among the three income groups established from the array of average (1939 and 1941) operator's net income per adult equivalent, were not only significant but also consistent. This suggests that where incomes were high relative to consumption needs, there was greater ownership, probably reflecting greater ease in capital accumulation.

Between 1939 and 1941 there occurred a small increase in farm ownership in all income groups. Four of the farmers in Class A who were tenants in 1939 were owners in 1941, two in Class B and one in the low-

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[1]Similar differences were noted by Witt in the 1939 study (43).

income group. The differences are probably too small for any inference on the changes in tenure among the income classes but they are suggestive.

Table 24. Distribution of Owners, Part-owners, and Tenants, by Income Classes, 1939 and 1941

	Income class					
	A		B		C	
	1939	1941	1939	1941	1939	1941
Number of owners	30	36	24	26	26	27
Number of part-owners	14	12	4	5	7	8
Number of renters	24	20	40	37	35	33
Total	68	68	68	68	68	68

Note: Chi-square value for 1939 tenure (owner, part-owners and renters) was 10.69, significant at the 5 per cent level. Chi-square value for 1941 tenure (owners and part-owners as compared with renters) was 9.45, significant at the 1 per cent level.

About 18 per cent of the tenants in the high income group were owners some time in their farming careers. The figure for Class B tenants was 11 per cent and that for the low-income group, 29 per cent. The size of the tenant groups does not provide a safe basis for any conclusion, though the data might point to a greater change of tenure status among low-income farmers.

There were no consistent differences in the types of leases held by tenants in the three income groups. Cash rent and crop share contracts were more popular in all classes than livestock share leases.

Scale and Efficiency of Farm Operations

In brief, the influence of size finds its expression in the volume of output and in certain efficiencies which, within limits, are associated with size. The one increases gross revenue and the other reduces gross costs.[1]

Before turning to a more detailed account of the volume of crop and livestock production and their relationship, an overall picture of the scale and efficiency of operations is desirable. No matter if one employs as a measure of scale (1) total value of capital managed, (2) acres operated, or (3) labor input, the conclusion is the same. Low-income operators are small farmers in terms of resources. (Table 25) Low income farmers operated farms with acreages averaging only about 45 per cent as large as Class A farmers, with a labor "requirement" 47 per cent as great, and managed a total value of capital only 40 per cent as large.[2]

In terms of income this clearly means that when price and cost relationships are generally favorable, low-income operators do not have sufficient scale of operations to provide high incomes. At the price and cost relationship which existed in 1941, low-income farms produced a flow of products too small for large returns.

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[1]This implies that average revenue is greater than average costs which was generally true in 1941. Empirical evidence indicates that the period 1930-1933 provides an illustration of the unprofitability of the larger farms. Management return calculations show that among members of Iowa Farm Business Associations largest negative returns occurred on the larger farms, the inference being that average costs exceeded average revenue. In the years 1934 to 1937 highest management returns were again made by the larger farmers. (16)

[2]Perhaps the most common measure of size in terms of labor is the productive-man-work unit. The measure of labor "requirement" is much the same. Implicit in both [illegible]

Table 25. Selected Measures of Scale and Efficiency of Farm Operations, by Income Classes, 1941

	Income class			Significance
	A	B	C	
Number of operators	68	68	68	
Operator's net farm income	$ 5019	$ 2082	$ 929	
Total acres operated	252.9	177.9	133.4	**
Value of total capital managed	$33,167	$20,378	$13,539	**
Labor "Requirement" (months)	22.9	15.9	10.7	**
Gross income per $100 total inventory	$ 120	$ 94	$ 93	**
Cash operating expense per acre	$ 7.67	$ 5.46	$ 5.66	*
Cash fixed expense per acre	$ 2.96	$ 2.61	$ 2.49	***
Ratio of labor input to "requirement"	1.00	1.08	1.37	No test
Net income per $100 net worth	$ 26	$ 25	$ 14	No test

*Group differences significant at the 1 per cent level.

**Group differences significant at the 5 per cent level.

***Group differences not significant.

Data from the section "Labor Supply and Utilization" provide a rough estimate of efficiency in the use of labor. The ratios of months of labor input to the calculated labor "requirements" show that low-income farmers employed 1.37 months of labor to accomplish the work done by

Class A operators in 1 month. On the basis of operator's net income per $100 net worth, low-income farmers received a gross return on their investment of only 54 per cent as great as the average farmer in Class A. Cash operating expenses were significantly greater for the higher income farmers, but the larger output more than offset the higher costs, making their net incomes larger. Low-income farmers had a slower rate of turnover on their investment in fixed and operating capital.

It seems evident that low-income farmers were receiving smaller incomes for reasons of both scale and efficiency. But these indications are much too superficial for an adequate picture. The problem needs further probing.

The volume of crop production

A large part of the effect of size in terms of acres comes by way of the volume of crop production for feeding or sale as cash grain. If, of a given group of farms of equal fertility and area, some operators devote 90 per cent to the production of high yielding feed crops and others but 50 per cent, the farmer are capable of supporting a larger quantity of livestock. Although low-income farmers as a group operated significantly smaller farms, part of the adverse effect of area might be overcome if they devoted a larger part of the smaller acreage to high-yielding feed crops. But actually low-income operators had a significantly smaller proportion of their more limited area in crop land.[1]

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[1] Similar differences were found in 1939 by Witt (43).

They had a smaller per cent of their land in corn and small grains. While the percentages of total acres in permanent pasture were consistently larger from the highest to the lowest income groups, the differences were not significant. (Table 26).

The more extensive land use among low-income operators was probably a reflection of the limited amount of land suitable for cropping. Evidence from the present study and that made in 1939 suggests a higher degree of erosion on low-income farms, perhaps a result of the over-cropping of land not suited to more than limited cultivation because of topography.[1]

Table 26. Percentage of Farm Land in Various Uses, by Income Classes, 1941

	Income class			Significance
	A	B	C	
Corn and small grains	47.8	45.8	38.1	**
Legumes	14.0	14.3	13.8	***
All hay	12.6	12.4	14.3	***
All crop land	66.5	61.8	57.1	*
Permanent pasture	17.4	19.3	22.4	***

***Group differences not significant.

**Group differences significant at the 1 per cent level.

*Group differences significant at the 5 per cent level.

[1]Between 1939 and 1941 all income groups decreased their acreage in crops, but the relative change was somewhat higher for the low-income group.

The volume of crop production is not only related to the size of farm in acres and the intensity of land use, but also to the efficiency of crop production. In Table 27 are shown selected measures of the rate of crop output. Low-income farmers produced a value of crops per acre significantly less than high income farmers. Their yields of corn and oats were significantly smaller. Although farmers in the higher income groups produced a quantity of total grain units and total roughage units per acre consistently larger, the differences were not significant. As a consequence of less intensive land use and lower crop yields, "acres in farm" was a poor measurement of the relative quantity of resources for crop production. In addition, there were more tenants in the low-income group. This means that in the case of crop-share contracts, a large part of the feed production went to the landlord. But what were the combined effects of these factors on total feed output? This is seen in Table 28.

In 1941 low-income farmers produced for their own use an average of about 2500 feed units, compared with 3800 for Class B farmers and 6700 for those in Class A.[1] On January 1, 1942 farmers estimated the amount of feed on hand. In terms of feed units, low-income farmers had about 31 per cent of their 1941 production on hand; Class B operators, 39 per cent and those in Class A, 43 per cent.[2] The smaller inventory

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[1] These data include only the operator's share, the amount going to the landlord on crop share farms having been omitted.

[2] These estimates did not include grain under seal. If this had been included it is probable that the differences would have been greater.

Table 27. Selected Measurements of the Efficiency of Crop Production, by Income Classes, 1941

	Income class			Significance
	A	B	C	
Total grain units per farm acre	20.1	17.3	14.0	***
Total roughage units produced per farm acre	5.0	4.8	4.1	***
Yield of corn per acre	57.5	52.1	47.5	**
Yield of oats per acre	34.8	34.9	30.7	*
Total value of crops per farm acre	$26.71	$25.88	$21.71	**

*Group differences significant at the 5 per cent level.
**Group differences significant at the 1 per cent level.
***Group differences not significant.

Table 28. Quantities of Feed Produced in 1941 and Amount on Hand January 1, 1942, by Income Classes[1]

	Income class			Significance
	A	B	C	
Feed units produced	6685	3786	2558	**
Feed units on hand, January, 1942	2900	1466	793	**

[1]Includes only operator's feed.

**Differences significant at the 1 per cent level.

available to low-income farmers is explained largely by differences in (1) the composition of the feed supply, (2) the rate of conversion of feed into animal products, and (3) purchases and sales of feed. It is possible that a part of the difference might also be explained by a greater desire upon the part of high income farmers to build up stocks for livestock expansion and as a safety factor against future shortages.

The conclusion seems clear that low-income farmers do not have the feed production necessary to permit a substantial increase in livestock output. This seems especially true in the case of hogs, since a large proportion of the feed output on low-income farms consisted of hay and pasture. The overall ratio of the quantity of livestock to the volume of feed production indicates that low-income farmers were not far below operators in other groups in pushing livestock production in relation to feed output.

Feed purchases and sales

The picture becomes more interesting with a consideration of the volume of feed purchased and sold. These data are shown in Table 29. As one would expect, farmers in the higher income groups bought and sold larger quantities of feed than did low-income farmers. Approximately the same number of farmers in each group purchased feed (other than commercial feed), although a considerably smaller number of farmers in Classes B and C sold feed. Considering the groups as a whole, Class A

farmers sold about 10 per cent more feed than they purchased, Class B operators bought about as much as they sold, while the low-income group sold about 45 per cent more than was purchased.

The question naturally arises, if feed supplies are limiting livestock production in the low-income group, why are they selling relatively more feed? Why don't they use this feed in expanding livestock production?

Table 29. Quantity of Feed Units Purchased and Sold, and the Value of Commercial Feed Bought, by Income Classes, 1941

	Income class		
	A	B	C
Number of farmers	68	68	68
Number of farmers buying feed[1]	26	26	28
Feed units purchased	618	296	160
Per cent of production purchased	9.2	7.8	6.2
Number of farmers selling feed	49	33	33
Feed units sold[2]	691	290	244
Per cent of production sold	10.3	7.7	9.5
Number buying commercial feed	67	67	66
Value of commercial feed bought	$263	$141	$ 88

[1] Other than commercial feed.

[2] Does not include crop share rent.

Note: Group differences for "feed units sold" and "value of commercial feed bought" were significant at the 1 per cent level. Other differences not tested.

In an endeavor to answer this question low-income farmers were divided into two groups, those who did not sell feed and those who did.

One hypothesis is that low-income farmers who sold feed may have been hard pressed for cash and could not wait for their income to accrue in the form of livestock and livestock products. As a result, they sold feed when they needed cash for farm operations, or home consumption. Table 30 shows the relevant evidence.

Table 30. Comparison of Selected Production, Income and Expense Factors for Low-Income Farmers Selling Feed and Not Selling Feed, 1941

	Farmers selling feed	Farmers not selling feed
Number of farms	37	31
Feed units sold	500	0
Acres in crops	79	66
Feed unit production (operator)	2620	2386
Feed units purchased (all farms)*	71	266
Number buying feed	14	14
Per cent of farmers buying feed	38	45
Feed units purchased (Number buying)**	188	590
Percentage of farmers tenants	59	39
Percentage of farmers owners and part-owners	41	61
Number of animal units	16.5	20.7
Interest payment	$ 79	$ 84
Taxes	$ 57	$ 74
Operator's net income per adult equivalent	$452	$385

*Averages based on total number of farmers in each group.

**Averages based on number of farmers reporting purchases of feed.

Somewhat fewer than half of the 68 farms in Class C did not sell feed. The 37 operators who did sell feed sold an average of 500 feed units.[1] Farmers selling feed had an acreage in crops about 20 per cent larger. Their total feed unit production was about 10 per cent greater. About 45 per cent of the operators not selling feed bought feed, compared to 38 per cent for those selling feed and their purchases averaged over three times as large. Farmers who did not sell feed had about 25 per cent more livestock. Around 59 per cent of the operators selling feed were tenants as compared with 39 per cent of those not selling feed. Upon considering two of the more important fixed expenses for which cash might be needed, taxes and interest, it was found that in neither case did the feed-selling group have larger payments to meet. If anything, the scale seemed to tip the other way. In terms of net operator's income per adult equivalent, the feed-selling group was no doubt in a better position as regards consumption. They received an income per adult equivalent of $452 as against $385 for the group not selling feed.

In the light of this evidence one might draw the tentative conclusion that need for cash was not an important factor determining the volume of feed sales.

It is possible that the feed-selling group contained a larger proportion of older operators who did not want to be bothered with additional

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[1] In terms of corn, at the rate of 8 bushels per 100 pounds of gain, the amount of feed sold might have produced about thirty 200-pound hogs per farm.

livestock and therefore sold the excess feed. The average age of the farmers in the feed-selling group was 48 years as compared to 49 years for the group not selling feed. A study of the distribution of ages did not change the picture. There seemed to be no real evidence to support this view.

The explanation may be related to the differences in tenure. Housing facilities are generally less adequate on rented farms. This may have been a deterrent? It may even be that the feed-selling group contained more operators who were not interested in expanding livestock production for non-monetary reasons. But whatever the reason, feed sales reduced livestock output to less than what it might have been if this feed had been utilized on the farm. Since feeding ratios were favorable it is probable that the net effect was a reduction in the operator's net income.

Low-income farmers purchased significantly smaller amounts of commercial feed (Table 29). But since their livestock enterprises were also smaller, this does not indicate the adequacy of supplementary feeds. A rough measure may be obtained by adjusting the value of purchases by the total quantity of livestock in animal units. This showed that low-income farmers purchased just slightly less feed per animal unit than those farmers in the high income group. Since high income farmers had a relatively smaller quantity of the important commercial feed-consuming livestock, i.e., more feeder cattle, relatively fewer chickens and milk

cows, it is likely that this measure indicates more liberal feeding than actually occurred among Class C farmers.

The volume of livestock production

The kind and quantity of livestock and livestock products produced on a farm are related to the volume and kind of feed produced and purchased and the efficiency of livestock feeding. From the substantial differences in feed production and purchase, one might infer important variations in the volume of livestock production. In Table 31 are shown quantities of various kinds of livestock produced and on hand January 1, 1942.

In terms of yearly animal units, low-income farmers in 1941 handled an average quantity of livestock which was but 35 per cent as large as that handled by Class A farmers and about 61 per cent as great as that handled by Class B operators.[1] Highly significant group differences were found in the numbers of milk cows, sows farrowed, pigs raised and calves produced. The number of beef cattle, calves and chickens on hand on January 1, 1942 was substantially less for the low-income group.

As a result of a combination of (1) greater feed production per acre, (2) more efficient feeding, and (3) relatively smaller sales of feed, farmers in the higher income groups were able to keep a larger quantity of livestock per acre.

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[1] Yearly animal units differ from the ordinary animal unit in that the former measure considers the time period animals are on the farm. See Appendix B.

Table 31. Quantities of Various Kinds of Livestock Produced in 1941 and on Hand January 1, 1942, by Income Classes

Kind	Income class A (number)	Income class B (number)	Income class C (number)	Significance
Pigs raised	102.8	72.5	37.2	**
Sows farrowed	17.2	12.1	6.7	**
Calves raised	10.8	9.2	6.1	**
Milk cows[1]	9.4	8.8	6.2	**
Beef cattle[1]	3.6	3.0	1.3	No test
Calves[1]	14.8	9.0	5.1	No test
Chickens[1]	211.8	172.4	137.8	No test
Total animal units	50.1	28.6	17.4	**
Number of animal units per acre	0.24	0.20	0.17	**

[1]Ending inventory.

**Group differences significant at the 1 per cent level.

The regression of livestock size on the volume of feed production indicated that for a given increase in the volume of feed output, low-income farmers expanded their volume of livestock less than did farmers in the high income group.[1]

[1]The size of the livestock enterprise was measured by "total yearly animal units", and the volume of feed production by "operator's total feed units produced." On livestock and crop share farms only the operator's share was included. The relationships were assumed to be linear, since the scatter seem to be of that nature, although no tests of "best" fit were made. The combined group differences for the regression coefficients were not significant, but the difference between Class A and Class C was significant at the 5 per cent level. As could be inferred from the size of the regression coefficients, the scatter for the combined groups was not linear.

	Income class A	Income class B	Income class C
Regression coefficient (animal units per 100 feed units	0.588	0.542	0.375

One might expect that because feed production was smaller on low-income farms, a given increase in feed output would be associated with a greater increase in the volume of livestock. But it has been shown that while the average amount of feed units purchased by Class A farmers was about 3.8 times the amount bought by low-income farmers, the net change, as a result of purchases and sales, indicated that low-income farmers sold relatively more feed. This suggests that low-income farmers had to dip more heavily into inventories and production, restricting their livestock enterprise even more. Thus it seems probable that although Class A farmers as a group sold more than they purchased, the relative effect on supplies available for feeding was proportionally less than for the low income group. Consequently, the slope of the regression was greater for Class A.

No doubt other factors are involved. The composition of the feed supply on low-income farms was such that for any given amount, it was less capable of supporting as much livestock, especially grain-consuming animals such as hogs. Differences in feeding efficiency were probably an additional factor.

The overall conclusion seems to be about this: low-income farmers were limited in their production of feed and cash crops largely as a result of (1) smaller acreages, (2) lower productivity per acre, and (3) relatively less land area in high yielding crops. The smaller volume of feed production had a direct influence on the volume of livestock, but the volume of livestock output was less than might have been

warranted by total feed production because of (1) relatively larger net sales of feed, and (2) a feed supply with a composition less capable of supporting livestock.

Accurate measures of livestock efficiency are difficult to obtain from data gathered by the survey method. Because of this, they are likely to be subject to greater error than the measures of scale. In addition, they are not sufficiently refined. Livestock efficienty factors reflect a host of other, more basic elements. For example, dairy income per cow is the result of (1) the price of butterfat, (2) the inherent ability of the cow to produce, (3) the amount and type of feed fed, (4) housing facilities, (5) timeliness of milking and feeding and many other factors. Each of these in turn is a result of still other factors. Consequently, their chief value is as supporting evidence in which the effects of other factors are reflected.

Low-income farmers obtained a significantly smaller income per sow and dairy income per cow. They raised somewhat fewer pigs per litter and had a smaller egg production per hen but these group differences were not significant (Table 32). As was suggested in an earlier section, the differences probably reflect poorer livestock, housing facilities, care and feeding.

It seems likely that livestock efficiency is somewhat lower among farmers in the low-income group. Yet, the large differences in income from livestock were largely explained not by the somewhat lower efficiency of the low-income group, but by the great variation in the size of the

Table 32. Selected Measurements of the Efficiency of Livestock Production, by Income Classes, 1941

	Income class			Significance
	A	B	C	
Hog income per sow	$ 145	$ 129	$ 113	**
Pigs raised per litter	6.0	6.3	5.8	***
Pigs raised to weaning age per litter	6.2	6.4	6.0	***
Dairy income per cow	$ 67	$ 71	$ 57	*
Pounds butterfat per cow	181.5	198.5	154.7	*
Income per hen	$ 1.6	$ 1.5	$ 1.3	***
Egg production per hen	87	79	69	***

*Group differences significant at the 5 per cent level.
**Group differences significant at the 1 per cent level.
***Group differences not significant.

livestock enterprises. Whether the low-income group could maintain its present livestock efficiency with a larger scale of operations is a matter of conjecture. Some of the same factors which reduced livestock efficiency were probably also limiting the quantity of livestock. Housing facilities and adequate feed are good examples. For a substantial portion of the low-income group adequate facilities for expanding the livestock program would also permit an increase in livestock efficiency.

Power and Machinery

Do operators in the low-income group have adequate power and machinery? Available data do not provide a sufficient answer, though some indication is given. Low-income farmers had fewer tractors and somewhat fewer horses. In terms of combined tractor and horse power, they had only about 40 per cent as much power available as farmers in the high income group (Table 33).[1] But since low-income operators were farming units with smaller acreages of crop land, their needs for power were also less.

By adjusting the total quantity of power (horse and tractor) by the number of acres in crops, a rough estimate of the relative adequacy of power can be obtained. No significant group differences were found for the number of crop acres per unit of power. This at least suggests that power was not a limiting factor in the operation of their present farms. Since the tractors owned by low-income farmers were generally older, they were no doubt in a somewhat poorer condition.

But what is probably more important, this does not show whether available power was a factor restricting the renting of additional land. Although the renting of additional land is usually difficult because of the competitive bidding of "surplus" tenants, it seems likely that the low-income group would require additional power to operate more land.

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[1] Tractor horse power was converted into horse equivalents by using the factor 0.6.

Table 33. Type and Quantity of Power and Machinery Investment, by Income Classes, 1941

	Income class			Significance
	A	B	C	
Number of farms	68	68	68	
Number owning tractors	61	49	41	No test
Number owning horses	68	65	62	No test
Number of horses worked	3.8	3.5	2.5	No test
Horse equivalent of tractor power[1]	12.3	8.1	6.3	
Total horse and tractor power	16.1	11.6	8.8	No test
Crop acres per unit of total power	11.4	12.3	10.8	***
Total machinery investment	$2016	$1255	$ 768	**
Machinery investment per crop acre	$13.9	$12.8	$11.1	***

[1]Tractor horse power rating converted into horse equivalent by using the factor 0.6. Group differences not significant.

**Group differences significant at the 1 per cent level.

***Group differences not significant.

There was little if any power available to the low-income group over and above their present needs.

In terms of all machinery and power, high income farmers had a significantly greater investment. But when the value of the machinery investment is adjusted for acres in crops, no significant group differences were found, although the figure for the low-income group was somewhat lower. The general impression of the enumerators at the time of the interviews suggests that machinery was in a somewhat poorer condition on low-income farms.

The Capital Problem

Much of the attention has been centered on the supply and utilization of productive factors. In the process, it was pointed out that for a substantial proportion of low-income farmers managerial capacity was probably not at present a limiting factor.[1] It seems likely that for another rather large group, neither managerial capacity nor labor was limiting their present operations. In terms of capital investment managed, it seems likely that the low-income group as a whole had not succeeded in attaining as close an approximation of the "optimum" farm as operators in the high income group. Because of variations within the low-income group, this generalization would not apply to each and every farmer. It seems evident that relative to management capacity, there was more "under-investment" than "over-investment" among low-income farmers, the net effect being a less than "optimum" size business for the whole.

Low-income farmers were located on small farms, producing a small supply of feed. They did not buy appreciable quantities of feed; as a group they sold more feed than they bought. Consequently, their livestock production was limited. In general, their building facilities were less adequate, which also affected the quantity and efficiency of livestock production. For many, the size of the livestock enterprise did not provide sufficient work to keep the available family and operator labor fully employed. As a result the size of their operations was less

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[1] Assuming a small amount of technical assistance was available to some.

than the "optimum", some resources were not being fully used. Under these circumstances, the rational approach to the problem of increasing net farm income would be to expand the scale of operations in such a fashion that all factors are fully employed. In the long-run the nature of the adjustment might be quite different than in the short-run, depending upon the "fixity" of the factors involved. The adjustment possibilities are many but their availability to low-income farmers may be slight.

Why don't low-income farmers have larger businesses? What factors are limiting their operations? Several have been pointed out. Some additional evidence is found in Table 34. These data are more suggestive than indicative and should be considered in that light.

Farmers were asked to state the reasons why they did not operate a larger business. Some farmers gave more than one reason. Low-income operators indicated a larger number of reasons than other income groups. About 81 per cent of the low-income farmers stated that the scale of their operations was limited by a lack of "capital".[1] Only 24 per cent of the Class A operators and 53 per cent of the Class B farmers gave this as a reason. Over half of the farmers in the high income group considered the size of their present business "sufficiently" large, com-

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[1]Since there was no common understanding of the term "capital", some farmers included land under capital while others excluded it. Some indicated particular physical resources such as feed, housing facilities or livestock, others did not. In order to make the data more comparable all physical resources were grouped under the term "capital".

pared to 12 per cent in the low-income group.

Table 34. Farmers' Reasons for Not Operating Larger Businesses, by Income Classes, 1941

	Income class[1]					
	A		B		C	
	Number	Per cent	Number	Per cent	Number	Per cent
Number of operators	68		68		68	
Lack of labor supply	21	32.5	20	30.3	35	52.2
Lack of "capital"	15	24.5	35	52.9	49	80.6
Present business of "sufficient" size	35	53.8	24	36.4	8	12.0
Uncertain about future	4	6.2	8	12.1	18	26.7
Age	0	0	2	3.0	5	7.5
Health	1	1.5	0	0	2	3.0
Other*	2	1.5	5	7.6	2	3.0
Total	78		94		124	

*Includes "lack of building space", "animal diseases", "large family", "insecure tenure" and "wife died".

[1]Percentages refer to the per cent of operators reporting each reason. Since some farmers indicate more than one reason, the percentages do not total 100.

A larger proportion of the low-income operators indicated that labor was a limiting factor. But how was it possible for 35 of the 68 low-income farmers to give this reason when the previous analysis might suggest otherwise. Some of the difference can be reconciled, while the remainder tends to support the earlier suggestion that all of the "under-employment" was not a result of a lack of work. Since the earlier evidence

was concerned with group means, within group variation would account for a part of the seeming discrepancy. In addition, there was no indication how large a business the farmer had in mind in stating that labor was a limiting factor. He may have been thinking of the neighbor's half section farm. Further, if low-income farmers were traditionally geared to a low work intensity, they may have considered increasing the size of their business without doing additional work themselves, and therefore believing they would need additional labor.

About 14 per cent of the farmers in Class C felt that future "uncertainty" limited their operations. Only 5 per cent of the high income group were of this opinion. A part of this difference can be explained by the large difference in the quantity of assets, which provided high income farmers with greater flexibility and willingness to "take a chance". Price uncertainty seemed to loom largest, although frequently farmers would speak about yield uncertainty. Many had not yet recovered from the drouths of the 1930's when their livestock enterprise received a severe setback.

A slightly larger number of low-income farmers said they were operating small farms because of age and health. However, the numbers were not appreciable in any group. This bit of evidence would lend additional support to the earlier observations on health and age.

In an endeavor to discover what farmers might do with additional capital, two questions dealing with the expenditure of an "unexpected" $500 were included in the schedule (Table 35). The first question placed no restriction on the use of the money, while the second limited

Table 35. How Farmers Would Spend an "Unexpected" $500, by Income Classes, 1941

1. General

Item of expenditure	Per cent of total expenditure		
	Class A	Class B	Class C
Consumption goods	2.5	3.5	5.4
Farm business	25.8	31.9	43.3
Repay debts	37.1	33.0	40.5
Total: farm business and repay debts	62.9	64.9	83.8
War Bonds	26.4	28.5	8.6
Other[1]	8.2	3.1	2.2

[1]Includes purchase of homes in town and investment in non-farm business enterprises.

2. Investment in the Farm Business

Item of expenditure	Per cent of total expenditure		
	Class A	Class B	Class C
Farm machinery	1.9	3.9	5.1
Building and building repair	13.2	9.1	15.5
Fertilizer and lime	0.0	0.7	0.0
Feed	3.1	0.6	5.8
Livestock	28.9	27.0	17.1
Land	4.4	9.0	14.6
Seed, tools and supplies	0.0	0.0	0.0
Repay debts	29.4	33.3	35.4
No investment on farm (inc. War Bonds)	19.1	16.4	6.4

its use to "investment" in the farm business.[1] Again, the data are merely suggestive. They point to the fact that low-income farmers placed more importance on debt repayment and investment in the farm business. Low-income farmers indicated they would spend less for war bonds and non-farm investments and somewhat more for consumption.

When the expenditure was limited to the farm business the group differences were not as large, except for non-farm investments. Low-income farmers stated they would spend somewhat more for machinery, land and to repay farm debts,[2] and less for livestock. The purchase of lime and fertilizer was not considered a desirable direction of expenditure.

Because of the great limitations attached to the data, few conclusions of even a tentative nature are possible. An accumulation of evidence seems to establish the fact that low-income farmers are limited in their operations by a lack of capital. Yet, the evidence also suggests that other factors loomed large in their thinking. The smaller feed supplies and livestock enterprises on low-income farms would seem to require increase if operations were to expand. Low-income farmers did not seem to be interested in buying feed. While they indicated an appreciable expenditure for livestock, it was no greater than that for land and

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[1] The exact questions were as follows: (1) Suppose you received an unexpected $500, what portion of this amount would you spend on consumption goods; what portion on investment in the farm business; what portion to repay debts; and what proportion on other investments? (2) Suppose you received unexpectedly $500 to invest (only) in your farm business, how would you spend this money? Several items were then listed.

[2] To some owners, a repayment of a farm mortgage was considered an investment in land.

buildings. All expenditures were subservient to the repayment of debts. For those low-income farmers having debts, repayment of their obligations seemed to be foremost in their minds, even at the expense of future income. To many, debts should be contracted only when necessary to prevent undue liquidation when the going was difficult. Few had any conception of the principle of "trading on equity", so familiar to the business manager. For some, unfavorable loan experiences in the past distorted their present judgment of the profitability of borrowing. Uncertainties entered their thinking frequently and sometimes suggested that their business judgment was not what it might be.

The aversion to borrowing and the desire to repay obligations probably affected the younger operators to a lesser degree. Involuntary capital rationing was probably more important to them, since they had fewer assets for collateral. This may be one reason why the FSA rehabilitation program finds a larger proportion of its clientele among the younger operators (33).[1]

The class difference in net income can be explained only in part by (1) present entrepreneurial capacity and (2) the degree of attainment of the "optimum" size business. Low-income farmers contributed smaller amounts of physical resources to the production process. This is shown in Table 36 by the differences in net worth. Since there were some

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[1]Occasionally a low-income farmer "revolted" against the idea of having a government representative from the FSA "tinkering" with his business. Frequently the services of FSA were not known to the farmer.

Table 36. Capital Investment, Debts and Equities, by Income Classes, January 1, 1942

	Income class			Significance
	A	B	C	
Value of all capital managed	$33,167	$20,378	$13,539	**
Value of operator's capital[1]	$23,721	$11,070	$ 8,037	**
Operator's total debt	$ 4,638	$ 2,803	$ 1,708	***
Operator's net worth	$19,083	$ 8,267	$ 6,357	**
Net capital ratio (equity)	83.5	81.7	81.0	No test
Ratio of interest payment to gross cash income	4.2	5.7	6.1	No test

[1]Includes capital subject to encumbrance but in operator's name.

**Group differences significant at the 1 per cent level.

***Group differences not significant.

tenants in all groups, the value of operator's capital was less than the value of managed capital.[1] Because of the larger number of tenants in Class C the value of operator's capital in the low-income group was a smaller proportion of total capital managed.

Higher income farmers had a larger average farm debt, but the differences were not significant. The net capital ratios (per cent equity) indicate that low-income farmers may have had a somewhat heavier debt load. They paid out a slightly larger proportion of their gross income for interest payments, suggesting that borrowed capital costs were a relatively larger drain on income.[2]

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[1] Operator's capital includes the value of all physical resources the title to which rested with the operator. Managed capital included in addition to operator's capital the value of rented land.

[2] The group differences were not tested statistically.

SUMMARY AND CONCLUSIONS

For analytical purposes the term "low-income" has two distinct connotations. The consumption concept of low-income implies a quantity of income insufficient to provide an "adequate" income. The production concept, on the other hand, is concerned with the use of resources and implies that resources are not being employed in the most economical fashion.

In analyzing the consumption concept of "low-income" use was made of a standard income developed by the Bureau of Agricultural Economics. This provides the basis for obtaining a first approximation of the extent of low income in Iowa. In 1941 about a fifth of families in a random sample of Iowa agriculture had a total of net cash income and value of home-used products per adult equivalent less than the Bureau's standard. In terms of operator's net income, about 5 per cent of the families had incomes in 1941 less than the standard. The comparable figure for 1939 was 35 per cent. In neither case do the income measurements give an accurate indication of low-income in terms of the Bureau's standard.

For further analysis of the consumption concept, all families falling in the lowest tertial division of the array of average (1939 and 1941) operator's net income per adult equivalent were compared with the upper and middle income groups. Low-income families were about 80 per cent

larger than high income families. The operators in the high income group were younger and older than those in the lowest group. They had fewer children to support, which was one reason they were not in the lowest income group.

Operators in the low-income group were not only supporting larger families but they raised larger families also. This had an effect on the amount of capital accumulation and therefore the scale of farming operations.

Low-income families (operators) received a AAA payment in 1941 about 46 per cent as large as the high income families, but since low income families were larger, the AAA payment in terms of people (adult consumption equivalents) was only 26 per cent as great.

Low-income families produced more farm products for consumption in the home, but since the families were larger, the amount for consumption per adult equivalent was significantly less.

High income families spent about 2.4 times as much for medical and dental care as did low-income families. The low-income group had significantly fewer telephones and refrigerators. Fewer low-income families had electricity and running water in the home. There were no significant differences in the ownership of radios. Low-income families had about the same number of automobiles, but they were usually of the less costly kind and older.

Important relations exist between the amount of income per adult equivalent, "capital" expenditure and the amount of net worth. The evidence indicated that farmers who had small incomes relative to the

size of their families, also spent less for "capital" inputs and had smaller net worth values, suggesting that the amount of income relative to consumption adversely affected the amount of capital accumulation and further the amount of capital accumulation affected the size of income through its influence on the scale of operations.

The data were insufficient to give a reliable indication of income stability. The figures indicated that farmers who had high incomes in 1939 tended to have high incomes in 1941, but with considerable movement in the position of farmers in the array. The difference in the coefficients of rank correlation for 1939 and 1941 incomes, between the upper half and the lower half of the array, points to a greater stability in the upper income groups. But the data are not sufficient for a tentative inference.

For the analysis of the production concept, operators who were in the lowest tertial division of the array of 1941 operator's net farm income were designated as low-income farmers. The content of these income groups differed appreciably from those established from the array of 1939 and 1941 operator's net income per adult equivalent.

Low-income farmers on the basis of net farm income tended to be younger and older than high income farmers. They possessed a smaller amount of farming experience. Low-income farmers had more experience as farm laborers, probably reflecting difficulties in accumulating sufficient capital to start farming.

There were no significant differences in the amount of formal schooling taken by farmers in the different income groups. Low-income farmers had about as much knowledge of the hog market as other farmers. A larger number of low-income operators reported health disabilities. Low-income operators stated they farmed for the same reasons as other farmers, except somewhat fewer of the low group were farming because of inheritance.

Low-income farmers did less planning of crops and livestock; they were less prone to keep farm records. They owned and used fewer purebred bulls in their breeding program.

It is estimated that perhaps a third of the low-income group were not at present subject to management limitations, another 30 per cent were troubled by consideration of technical management, the remainder being affected by a number of factors.

Low-income farmers were making very poor use of their labor. A part of the "under-employment" was the result of a lack of crop and livestock work, farm organization not adapted to mechanization, lack of proficiency, and a high value upon leisure. There seems to be little doubt that there exists in the low-income group an amount of labor at present not fully employed, which could be more productive if provided with proper incentives, facilities and some technical help in management.

Low-income farmers were small operators in terms of resources. They were limited in their production of feed and cash crops, largely

as a result of (1) smaller acreages, (2) lower productivity per acre, and (3) relatively less land area in high-yielding crops. The smaller volume of feed production had a direct influence on the volume of livestock, but the volume of livestock output was less than might have been warranted by total feed production because of (1) relatively large net sales of feed and (2) a feed supply with a composition less capable of supporting livestock.

Low-income farmers were somewhat below other farmers in livestock efficiency. Yet, the large differences in income from livestock were largely explained not by the somewhat lower efficiency of the low-income group, but by the great variation in the size of the livestock enterprises.

Relative to their present needs, it seemed probable that low-income farmers were about as well supplied with power as other operators, but they did not have a slack in their power supply large enough to permit them to rent additional land.

There were more tenants in the low-income group. A significantly large proportion of the low-income farmers were of the dairy and general types.

An accumulation of evidence indicated that low-income farmers considered themselves short of capital. But they were more interested in repaying their obligations than borrowing additional money to expand their operations. Uncertain and unfavorable past experience loomed large in their thinking. It seems quite probable that this voluntary type of capital rationing was affecting the younger operators to a larger degree than those in the older age groups.

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APPENDIX

Appendix A

1. Operator's net cash income includes income from (a) crop sales, (b) sealed corn, (c) livestock and livestock product sales, (d) off-farm hand labor, (e) custom work, (f) AAA, (g) land rented out, (h) non-farm work, and (i) miscellaneous sources, and the following expenses: (a) hired labor, (b) commercial feed; (c) crops purchased, (d) lime and fertilizer, (e) other crop expense, (f) livestock expense, (g) machine hire, (h) seeds purchased, (i) machinery repairs and tractor operation, (j) miscellaneous expense, (k) building repair, (l) truck and auto expense, (m) interest, insurance, taxes and cash rent, (n) livestock purchased, (o) equipment and machinery purchased, and (p) new improvements purchased.
2. Family net income includes (a) all cash income included in (1) and in addition (b) income from inventory increases and (c) income to other members of the family, and as expenses (a) all expenditures listed under (1) and in addition (b) inventory decreases.
3. Operator's net income -- same as Family net income except that income to other members of the family is omitted.
4. Net farm income - includes income from (a) crop sales and sealed corn, (b) livestock and livestock product sales, (c) off-farm hand labor and custom work, (d) home used products and (e) inventory increases, and as expense all the items listed as expense for family net income.
5. Home-used products includes the following farm products used in the home: (a) livestock butchered, including poultry, (b) butterfat, (c) eggs, (d) potatoes, (e) farm fruit and vegetables canned and (f) farm wood.

Appendix B

1. The B.A.E. standard income for Southern Minnesota (26):

Average size of family 4.4 individuals: 1.4 males and 1.1 females over 18; 0.1 males and 0.1 females 13 to 18; 1.0 child 7 to 12 and 0.7 children under 7 years.

Family living from farm:

Item	Amount	Value
Garden	1 acre	$ 87
Milk	300 gal.	$ 44
Eggs	80 doz.)	
Poultry	95 lb.)—	$ 66
Pork	270 lb.)	
Beef	400 lb.)	
Fuel		$ 55
Total value of living from farm		$252

Cash required for living:

Item	Value
Food	$136
Household operation	$100
Household furnishings	$100
Clothing	$ 80
Medical care and insurance	$ 64
Personal	$ 25
School, recreation and gifts	$ 55
Total	$560
Total value of cash and family living from farm	$812
Value of dwelling	$1000 to $1500

2. Scale of adult equivalents:*

	Adult equivalents
Males, age 19-60	1.0
Males, above 60	0.9
Females 19-60	0.8
Females above 60	0.7
Males 16, 17 and 18	1.2
Females, 16, 17 and 18	0.9
Child 13, 14 and 15	1.0
Child 11 and 12	0.8
Child 9 and 10	0.7
Child 6, 7 and 8	0.5
Child 4 and 5	0.4
Child 1, 2 and 3	0.3

3. Family and operator work assignments:

	Age	Months of work
Operator (male):		
	Less than 60	12
	60 to 70	8
	70 to 80	5
Sons:		
In school -	Less than 10	0
	10 to 12	2
	13 to 14	3
	15 to 18	4
If not in school-		
	Less than 10	0
	10 to 12	3
	13 to 14	6
	15 to 18	12
Daughters above 14		1
Wife of less than 60		1

*The adult equivalents were prepared from studies of the consumption expenditure of people of different age and sex. The consumption of the male, age 19-60 was employed as the standard unit. The scale was developed by Carle C. Zimmerman from computations made by L. Emmet Holt as outlined in "Food, Health and Growth", and quoted in Kirkpatrick, E.L. and Tough, G. Evelyn, Measuring Cost of Family Living, Journal of Sociology, 37:3:424-425, 1931.

4. Yearly animal units:[1]

Milk cows and beef cows - average of beginning and ending inventory numbers equals animal units.

Calves - average of inventories divided by 4.

Steers, bulls and heifers - Average of inventories plus $\frac{1}{2}$ the sales multiplied by 0.66.

Fall pigs - number raised multiplied by 0.03.

Spring pigs - number raised multiplied by 0.09.

Stags, boars, sows and other hogs over 8 months - average of inventories multiplied by .2.

Sheep 1 year and over - average of inventories divided by 7.

Sheep under 1 year - average of inventories plus $\frac{1}{2}$ the sales, divided by 14.

Chickens - average of inventories plus $\frac{1}{2}$ the sales, divided by 100.

5. Labor "requirement" conversion factors:[2]

Crops

For grain	Hours per acre	For hay	Hours per acre
Corn	18	Soybeans	17
Oats	8	Alfalfa (3 cuttings)	11
Wheat	10	Clover	6
Barley	9	Timothy	6
Flax	12	Timothy & clover	6
Soybeans	12	Lespedeza	6
Sorghum	14	Oats	8
Popcorn	20	Wild hay	2
Tomatoes	90	Cowpeas	17
Potatoes	50	Sudan	8

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[1] Adapted from Schickele, Rainer. Economics of agricultural land use adjustments, 1. Methodology in soil conservation and agricultural adjustment. Iowa Agricultural Experiment Station. Research Bulletin 209. 1937.

[2] Adapted from studies of labor utilization on record-keeping farms in Iowa, Minnesota, Indiana and Illinois.

Livestock	Hours per animal unit
Spring pigs and sow	69
Fall pigs and sow	60
Sows and stags	12
Other hogs (fall pigs previous year)	16
Milk cows	130
Beef cows	40
Calves	50
Heifers	55
Steers and bulls	25
Sheep over 1 year	24
Sheep under 1 year	48
Chickens	210
Horses (per head)	85

6. Criteria for typing farms:

The typing criteria were applied in the order given.

Cash Grain Farms

Farms which sold 30 per cent or more of incoming feed units (production plus purchase, exclusive of inventories)

Hog Farms

a. Farms having over 35 per cent of total animal units in hogs.
b. Less than 60 per cent of total animal units in cattle.
c. Less than 40 per cent of total animal units in milk cows.

Dairy Farms

a. Farms having over 40 per cent of total animal units in milk cows.
b. Less than 35 per cent of total animal units in hogs.
c. More than 50 per cent of total cattle animal units in milk cows.
d. More than 60 per cent of total animal units in cattle.

Cattle Farms

a. More than 60 per cent of total animal units in cattle.
b. Less than 50 per cent of total cattle animal units in milk cows.
c. Less than 40 per cent of total animal units in milk cows.
d. Less than 35 per cent of total animal units in hogs.

General Farms

All other farms which did not fall in any of the above types.